Three spotlights on careers: Examining gender differences, social networks and managers' efforts

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Abstract English

The aim of this cumulative dissertation is to give three specific insights into the broad topic of careers: The first study is a meta-analysis regarding the different promotion success of men and women. The sample is based on 498 estimates of 107 studies done in academic, business and federal organizations. The results show a significant female disadvantage, which is independent of the measure of career success.

The second study focuses on how social networks influence academic career success. The results show that the proportion of women in the upper level of a university is a major predictor, whether a specific network structure leads to slow or fast promotions for women. A higher proportion of women allows them to be successful with the same network structure and to achieve similar career outcomes as men.

The third study examines the work efforts and its reliable measurement of top-managers. The study proposes Golf handicaps as an unconventional and innovative effort measure. The study is based on the idea that the more time managers invest in their golf handicap, the less time they can spend on work activities. The results indicate that the golf handicap really can be seen as proxy for the effort a manager invests in the firm. Position changes of managers over eight years are used to control for individual characteristics.

Abstract Deutsch

Das Ziel dieser kumulativen Dissertation ist es, drei spezifische Einblicke in das breite Thema der Karriere zu geben: Die erste Studie ist eine Meta-Analyse bezüglich unterschiedlicher Beförderungserfolge von Frauen und Männern. Das Sample basiert auf 498 Ergebnissen aus 107 Studien, durchgeführt in akademischen, unternehmerischen und staatlichen Organisationen. Die Ergebnisse zeigen, dass unabhängig davon, wie Karriereerfolg gemessen wurde, ein signifikanter Nachteil für Frauen besteht.

Die zweite Studie beschäftigt sich mit der Frage, wie soziale Netzwerke den akademischen Karriereerfolg beeinflussen. Die Ergebnisse zeigen, ob eine bestimmte Netzwerkstruktur zu langsamen oder schnellen Beförderungen von Frauen führt, wird entscheidend beeinflusst vom Frauenanteil auf der professoralen Ebene einer Universität. Ein höherer Anteil erlaubt Frauen, mit den gleichen Netzwerken wie Männer einen vergleichbaren Karriereerfolg zu erzielen.

Die dritte Studie untersucht die Arbeitsanstrengung und deren zuverlässige Messung von Top-Managern. Die Studie stellt Golf Handicaps als unkonventionelles und innovatives Leistungsmass vor. Die Idee besteht darin, dass je mehr Zeit Manager in das Golf Handicap investieren, desto weniger Zeit bleibt für das Management. Die Ergebnisse zeigen, dass das Handicap tatsächlich als Proxy für die Leistung eines Managers fungieren kann. Positionswechsel von Managern wurden über acht Jahre untersucht, um für individuelle Charakteristiken zu kontrollieren.

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1 Synopsis

1.1 Introduction into careers

The aim of this dissertation is to give three thematic spotlights on the topic of careers. These spotlights offer the opportunity not only to gain insight into specific research questions, but also to get a broad overview what the topic of careers consists of. Before I give an overview of my research and explain the specific contributions, I want to define the term career and explain briefly the roots of career research.

The term career has its origins in the French word *carrière* (Arthur, Hall, & Lawrence, 1989). This was meant to describe a road or racecourse. Therefore the original use in the English language was designated to mean a racing course (Arthur et al., 1989). Later the word developed to describe progress in life (Arthur et al., 1989). In today's general understanding, the word career can be understood as being any passage through life. Gunz and Peiperl (2007, p. 6) describe that research on career "*is an exploration of what one sees when one looks at people, networks, organizations, institutions, or societies through a lens that focuses on the passage of time.*" This broad explanation also includes examples that are not related to jobs in organizations, for example the careers of drug users or the careers of tuberculosis patients (Gunz & Peiperl, 2007). My research does not include this very general meaning and I concentrate on the careers of workers and managers. Therefore, a good and modern definition of how I understand the term career is from Ng and Feldman (2014, p. 170), which is based on the research of Arthur et al. (1989) and Feldman (1989): "*A career is the unfolding sequence of a person's work experiences over time and across multiple jobs, organizations, and occupations.*"

For a common understanding of the word career, it was necessary to establish career research as its own research field. Others have given great overviews of the historical roots and the areas the career research consists of (e.g., Arthur et al., 1989; Gunz & Peiperl, 2007). In this introduction, I want to give an essential overview of the history of the research field. Careers as its own research field was established about thirty to forty years ago (Arthur et al., 1989). Psychologists and sociologists are the ones who laid the groundwork for career research (Arthur et al., 1989; Moore, Gunz, & Hall, 2007). Before that time, researchers with interest in examining the careers of individuals were scarce. They collected theories from various research disciplines in order to develop plausible theoretical models (Arthur et al., 1989).

Since the establishing of careers as its own research field, several developments have occurred, as it is the case for most research fields. In the traditional perspective, the typical career of an individual was an *organizational career*: An individual started to work at a specific organization and climbed up the hierarchical levels by a steady series of upward promotions in this organization (Ackah & Heaton, 2004; Arthur, 1994). Changes of employers were seldom and the way to the top was already set up. Today, an individual's career is shaped by more uncertainty and more mobility than was the case in the 20th century (Gunz & Peiperl, 2007). Of course, this influenced career research. As a result, the career field has advanced and has integrated other agendas such as network phenomena, emergence of nontraditional careers or research on top-managers[1] (Gunz & Peiperl, 2007). The interest of society regarding career has changed as well. The topic of diversity, for example, career differences between men and women, is today a common topic in public and academic debates (Catalyst, 2007; EU, 2012; GrantThornton, 2013; Warren, 2009). Unsurprisingly and as a result, career research on the topic of women and their careers has experienced an increase in interest as Figure 1.1 shows.

Figure 1.1: Number of publications regarding gender and careers

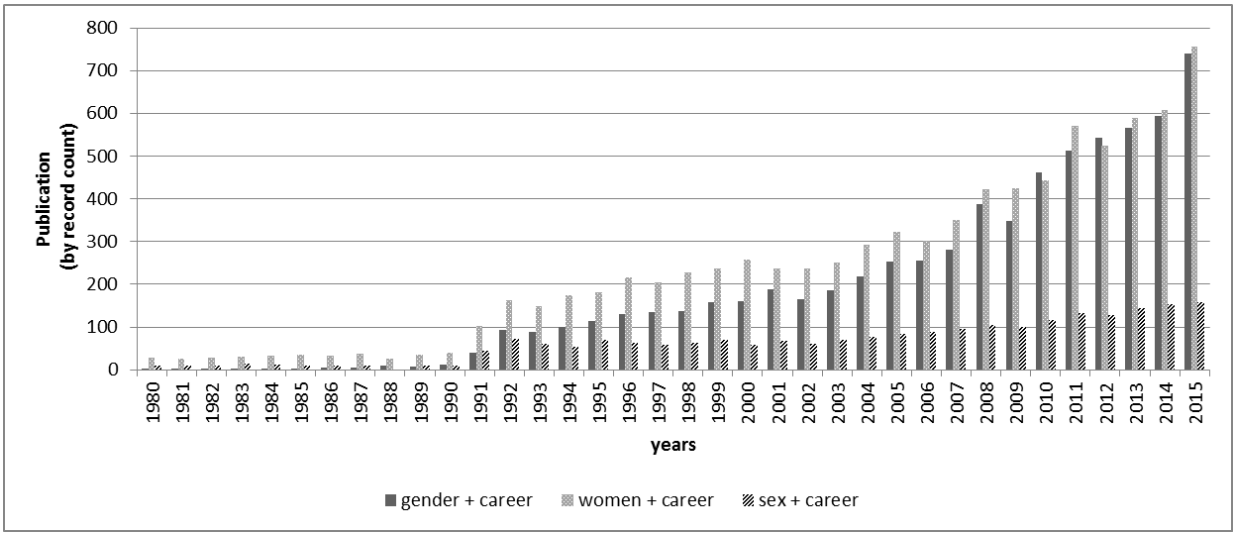

Figure 1.1 shows the publication count of a Web of Science topic search on the rise of gender as a career topic from 1980-2015. The results of three different keywords are displayed: *gender career*, *women career* and *sex career*.

[1] Networks have gained importance because they help individuals in their careers (Burt, 1992; Granovetter, 1983). The research on non-traditional careers is a result of the new ways employees climb up the career ladder, for example, by switching firms and occupations (Arthur, 1994). The research on top managers is part of the career field, because managers are the most mobile employees and they switch companies regularly. Because of this, especially the top management and the background of top managers have been shown to be important for organizational outcomes (Hambrick & Mason, 1984; Stahl & Cerdin, 2004).

My research is on these changes and develops existing research further. For example, in the career field, the network phenomena are often only examined under the aspect of mentoring-mentee relationships (Gunz & Peiperl, 2007), which is somehow a very narrow view on the social network research. I offer a broader and more comprehensive network approach. Another example is the research on gender differences, in which inconsistent results have not, so far, been appropriately discussed. I try to shed light on this issue by comparing the relevant studies in a meta-analysis. In the following section (Section 1.2), I will give a brief overview of the contents of each study. To clarify my research context and its boundaries, I will synthesize the three studies of this thesis into four metathemes in Section 1.3. In Section 1.4, I will discuss issues and gaps in the career research. The aim is to show how this thesis fills research gaps and what the contributions to the literature are. Finally, in Section 1.5, I will explain my personal contribution to the respective studies, because the second study (Schoen, Rost, & Seidl, 2016) and the third study (Schoen, Ehrmann, & Rost, 2015) of this dissertation have been developed together with co-authors.

1.2 A short overview of the contents of each study

Chapters 2, 3 and 4 of this thesis contain three independent studies. This means that in order to understand one study, it is not necessary to have read one of the other chapters. In the following I want to give a very short overview of the content of each study.

The first study (Schoen, 2016) of this dissertation is a meta-analysis of the existing literature regarding the different promotion success of men and women. The study distinguishes several kinds of promotion success, e.g., *speed of promotion*, *number of promotions* or *reached upper position*. The sample is based on about 400 estimates of more than 100 studies done in academic, business and federal organizations. The motivation for this work is to examine the existence of a promotion difference between men and women. In the literature there are controversial findings regarding this difference. The results show that there is a significant female disadvantage, which is independent of the measure of career success. For example, women are less likely to reach the upper level of an organization and with a slower speed than men do. Further, there is a reporting bias in the career literature. Studies that report small and no gender differences are underrepresented in the research. As a result, the gender promotion gap is exaggerated. Nevertheless, even after controlling for this reporting bias, significant gender career differences remain.

The second study (Schoen et al., 2016) is carried out within the area of academic careers and is done together with the co-authors Katja Rost and David Seidl. This research focuses on the question of how social networks influence career success. Success is measured by the promotion speed of academics to the professorial level. The social networks are based on co-authorships, mutual teaching duties, committee memberships and research group memberships. So far in the career literature, the effect of social networks is sparsely linked with objective career success; one aim of the study is to fill this gap. The result shows that the proportion of women in the upper level of an organization is a major predictor of whether a specific network structure leads to slow or fast promotions for women. A higher proportion of women allows women to be successful with the same network structure and to achieve similar career outcomes as men. In contrast, for the career speed of men, the proportion of other men does not have a significant influence. A network structure with brokerage opportunities is always beneficial for them.

The third study (Schoen et al., 2015) examines the work efforts of managers in the highest hierarchical level of a company; this work was done with Thomas Ehrmann and Katja Rost. Many studies have discussed the motivation of such top managers, but to find a reliable measurement for the true effort a manager invests in the firm remains difficult and problematic. The study examines the effort of a manager with an unconventional and innovative approach: the invested time in leisure activities measured by golf handicaps. The golf handicap is a numerical representation of the playing potential of a person. The idea is that the more time managers invest in their golf handicap, the less time they can spend on work activities. The study uses an eight-year time period, to observe handicaps and includes times of crisis as well. The results indicate that the golf handicap really can be seen as a proxy for the effort a manager invests in the firm. Especially during times of crisis, CEOs that own the company act differently compared to CEOs acting as agents for the owner(s). To control for characteristics of single managers, position changes are in the focus of the study.

1.3 A taxonomy of career research

1.3.1 Four metathemes

Career researchers come from different research disciplines, such as psychology, business administration, economics, and sociology. The career field is therefore a diverse field regarding theories, approaches, perspectives, etc. The idea of this chapter is to categorize the studies of this thesis in order to give some orientation in the broad interdisciplinary field. It is

important to understand, that "*[s]ocial research and social research methods are embedded in wider contextual factors. They are not practiced in a vacuum*" (Bryman, 2015, p. 14). I will use the systematic of Moore et al. (2007, p. 21) to sort my studies into four metathemes:

(1) *"individual agency versus social determinism"*
(2) *"career as achieving fit versus career as process"*
(3) *"fit for the benefit of the individual versus fit for the benefit of the collectivity"*[2]
(4) *"career scholarship as theoretical prediction versus career scholarship that provides help for individuals living their careers"*

These four themes are derived from the roots of career theory, work across disciplinary limits and separate different career theories. They are dialectic and describe a tension between opposing concepts. Most metathemes have two dimensions that stand in contrast to each other. In the following, I explain briefly the contradictions and give the reader an idea what the contents and dimensions of each metatheme are about.

1.3.1.1 Individual agency versus social determinism

The view of the individual agency of the first metatheme relies on the argument that the individuals are responsible for their career success and should find out the personal capacities on their own. This is basically a self-help idea, and the struggle to succeed goes back to Samuel Smiles and the Weberian concept of the Calvinist (Smiles, 1859; Weber, 1958). The contrary argument of this metatheme is the argument of social determinism. The social determinism describes how macrosocial structures influence the individual career (Moore et al., 2007). In other words, the social systems and the social structure shape individual careers and are responsible for the success of an individual.

1.3.1.2 Career as achieving fit versus career as process

The second metatheme views career as a choice or as a dynamic process. Representatives of the choice perspective argue that individuals should learn about their skills and features and should then make an appropriate decision regarding the job in order to achieve career fit (Moore et al., 2007). From this perspective the "issue" of career is solved by the right choices of the individual and by placing qualified persons into the right position. An often cited representative of this perspective is Holland (1966, 1973). However, from the process point of view, career is a dynamic process, in which different needs, values and choices are prioritized

[2] Moore et al. (2007) split this metatheme into two different themes. The demarcation is difficult and the differences are less relevant for my research studies. Therefore I decided to simplify and to merge two metathemes into one.

during the life course. Through the lifespan of an individual, the developmental tasks of career stages should change according to the current stage. Representatives of the dynamic perspective are often interested in exploring different possible ways of careers, while the achieving-fit scholars have a higher interest in the achievements an individual has made (Moore et al., 2007).

1.3.1.3 Fit for the benefit of the individual versus fit for the benefit of the collectivity

The third metatheme is the question regarding for whom a career should fit and who should benefit from the fit (Moore et al., 2007). This metatheme can be divided into three levels: the micro-level, which implicates fit and benefits for the individual, the meso-level, which would indicate fit and benefits for the organization and the macro-level, for which the society is the beneficiary. The first view examines the person-job fit in order to meet the goal of self-expression or growth of the individual (Moore et al., 2007). This perspective emphasizes the importance of a good person-job fit to achieve individual self-expression. By having positive career experience a person is excited and satisfied with the achieved job advancement. The meso-level is about the organizational effectiveness. In this vocational perspective, the society as well as the individual is benefitting. The main idea is that the individual can express interest and talents by being in the right position (Moore et al., 2007). For the organization the idea is that the right job for a person leads to efficiency and productivity. Schein (1971) emphasizes this perspective and argues that the individual and the organizational needs should both be integrated in the career process. The last level, the macro-level is about the reproduction of social order by fitting persons into the right job (Moore et al., 2007). Following the arguments of Durkheim (1933) and Weber (1958, 1964), the career aims to integrate a person into her/his social environment in order to stabilize and preserve the social order.

1.3.1.4 Career scholarship as theoretical prediction versus career scholarship that provides help for individuals living their careers

The last metatheme can be termed as generating theory versus solving problems in practice. Theory can be developed inductively as Durkheim (1933) and Weber (1958, 1964) do, or it can be developed with the help of empirical data as Hughes (1928, 1958) and his colleagues do. On the opposite side of this metatheme, researchers are trying to solve practical career problems. These practical orientated approaches include helping unemployed people to find jobs or helping organizations to make the right hiring decisions (Moore et al., 2007). In this perspective, researchers often use existing theories and combine these with empirical data.

1.3.2 Sorting the studies to the metathemes

In the following, I categorize my three studies into the presented metathemes accordingly. The Arabic numbers stand for the respective metatheme and the Roman numerals stand for the first (Schoen, 2016), second (Schoen et al., 2016) and third (Schoen et al., 2015) study of this dissertation.

(1) Individual agency versus social determinism:

I. The meta-regression study (Schoen, 2016) includes both the perspective of the individual agency and the perspective of social determinism. The meta-study includes variables of individual responsibility, such as human capital and individual performance; but the study also incorporates effects of social determinism, such as being discriminated against in the career, due to performance independent characteristics – for example, having children or being ethnically different.

II. The network study (Schoen et al., 2016) is mainly about how individuals influence their career success regarding their personal social network and is therefore rooted in the perspective of individual responsibility. Elements of social determinism only play a very indirect role and they are not accounted for in the regression models.

III. The golf study (Schoen et al., 2015) concentrates on the individual's effort and motivation. The individuals are responsible for their actions and therefore the paper argues with the individual agency. The social determinism perspective is not part of it.

(2) Career as achieving fit versus career as process:

I. The meta-regression study (Schoen, 2016) concentrates on the objective career success of individuals based on the choices they have made. Studies that measure career success, including my meta-analysis, are best described with the career as a choice perspective. Because the focus is not on how the career develops in different phases, but rather more on the question of what an individual with specific characteristics has achieved so far, the process view is not part of the meta-analysis.

II. The network study (Schoen et al., 2016) uses an objective career success measure as dependent variable. Therefore, achieving fit is the dominant perspective this paper uses. Nevertheless, some elements could be seen as

dynamic elements belonging to the process view. An example of this would be the signaling variable that controls for the number and prestige of the universities a person has attended so far. This measure can be seen as a simple indicator for the career process or the previous stages of an individual, although this variable only touches what normally is done in this perspective.

III. The golf study (Schoen et al., 2015) is more a dynamic study even though not in the classical understanding of this perspective. The paper is not about the different needs of an individual in different stages, but rather is about how effort and motivation change when the career position changes. This is a process perspective because the position change of an individual is the main focus of this study.

(3) Career as a social phenomenon versus career as an individual life story:

I. The meta-regression study (Schoen, 2016) uses research on the individual level to draw conclusions for the macro level. Therefore, the study incorporates the micro and the macro levels: individual differences were aggregated in order to answer the social question whether or not there is a gender promotion difference in the society. The gender gap as a main question follows the vocational arguments of efficiency and productivity. When women are less promoted as compared to men, although they have the same skills and levels of human capital, the efficiency of the society is reduced and human capital is wasted.

II. The network study (Schoen et al., 2016) focuses on the individual, by comparing the success of persons with different personal network structures. Therefore, this research is based on the individual level, although it is possible to derive policy implications for the organizational or social level from the results of this study.

III. The golf study (Schoen et al., 2015) is best described as a paper on the meso-level. The research question is about which type of manager invests which amount of effort in the company. Therefore, organizational benefits depend on different manager types. Although, this is not the typical study in this area, because I do not compare the background of the manager extensively, it still fits into the meso-level research.

(4) Career scholarship as theoretical prediction versus career scholarship that provides help for individuals living their careers:

I. The meta-regression study (Schoen, 2016) is clearly located in the practical part of the research. The interest is to test for a gender promotion gap. I do this by using several theories to formulate hypotheses. The implication that can be drawn from the results can help to enhance the theory, although the study itself does not develop new theoretical approaches.

II. The same is true for the network study (Schoen et al., 2016). In this study the theory of social networks is used to explain how individuals are linked on the interpersonal level and how individuals can benefit from their personal social network for their career success. The issue is examined by using the existing theory and approaches.

III. The golf study (Schoen et al., 2015) also does not develop new theories. Rather, in line with the other studies, existing and contrary theories are used to examine a practical issue – which type of manager invests more effort in the firm.

1.4 Contributions

Now that I have clarified the context of my research, I want to turn to the research gaps this dissertation fills. Good research is characterized by making a distinct contribution and by demonstrating links to the already existing knowledge (Bryman, 2015). The following section provides an overview of the links and the contribution of this dissertation. I concentrate on the main contributions, while smaller contributions are described in the studies itself.

1.4.1 Combining research from different disciplines

Today, researchers with an interest in careers and the behavior of individuals in organizations come from different social sciences, such as psychology, business administration, economics, and sociology. Therefore, one would expect that a vivid exchange of the different academic disciplines characterizes the career field. But this is quite often not the case. Authors writing about the career field criticize that there is a lack of interdisciplinary integration of career studies and many researchers are caught in their boundaries, ignoring the results of others (Arthur et al., 1989; Moore et al., 2007). I use an interdisciplinary perspective in this thesis to tackle this critique in several ways:

First, I have respected and included research results regardless of the discipline they are coming from. This is done, for example, in the first study (Schoen, 2016). The estimates for

this first study come from papers in sociology, management studies, psychology and economics.

Second, I combine research approaches from different fields in order to advance research and to draw a more complete and integrative career picture. For example, the second study (Schoen et al., 2016) uses theories from social psychology, such as the social identity theory and the token theory, and combines these with approaches from sociology, such as the social network approach.

Third, I am dealing with research questions that cover topics of several disciplines. For example, the gender career gap of the first study (Schoen, 2016) is typically examined by business administration scholars as well as sociologists. The same is true for the third study (Schoen et al., 2015): Incentives and efforts of managers are discussed in economic papers, but also in sociological papers. Therefore, the analysis is not bound to a specific discipline, but tries to handle a research question that is interesting for a lot of researchers in different fields.

Fourth, the interdisciplinary integration of this work is also reflected by the use of various methodological approaches. According to the respective research question, I have used meta-regression analysis (Schoen, 2016), social network analysis (Schoen et al., 2016) and longitudinal regressions (Schoen et al., 2015; Schoen et al., 2016).

1.4.2 Controversial results on the differences between men and women

1.4.2.1 Promotion differences

The research on career differences between men and women is not free of controversial results. A prominent example is the gender promotion gap. This gap describes that women, face promotion disadvantages although there are no performance-related differences that would justify the disadvantage. The major part of the literature confirms this gap and reports several kinds of disadvantages for women, such as fewer advancement opportunities (Litzky & Greenhaus, 2007; Ragins, Townsend, & Mattis, 1998), fewer promotions (Addison, Ozturk, & Wang, 2014; Lyness & Judiesch, 1999), and a slower promotion rate (Ginther et al., 2009; Sabatier, 2010). However, there are also several studies that deviate from these findings and either come to ambiguous results (e.g., Bergeron, Shipp, Rosen, & Furst, 2013; Bidwell, 2011; Su, 2014) or find no promotion difference between the genders (e.g., Booth, Francesconi, & Frank, 2003; Dencker, 2008; Gayle, Golan, & Miller, 2009). This opens up the question as to which perspective is right and whether the female promotion gap exists or

not. In general, the research field on promotions is rather heterogeneous and not all results are sound. For example, some studies that investigate gender differences are using simple mean comparisons. Morgan, Schor and Martin (1993) investigate gender differences in career paths of middle managers in banks by comparing t-statistics for the difference in years to middle management. Such approaches contain the danger of getting results that do not reflect the true value, because predictors such as education are left out. The omission of important variables, regardless of the regression model, could lead to a wrong common knowledge in the research field.

These shortcomings are addressed in my first study (Schoen, 2016). The meta-regression approach uses the results of existing studies and controls which predictors the studies include and which predictors they fail to include. By aggregating the existing results and controlling for the relevant predictors, the meta-analysis comes to a realistic picture regarding the link between gender and promotions and allows answering the controversy.

1.4.2.2 Network differences

Apart from the contradictory results in promotions, I focus on a second controversy in the career literature: Are men and women successful with the same social network structure or do they benefit from different structures? In research, the term social network stands for all relations a person has to others (Borgatti & Foster, 2003). A single relation, called network tie, describes a social interaction between two persons. From this perspective, a person invests time and effort in social relations, because s/he expect returns from these relations (Lin, 1999). Different kinds of returns have been identified, such as power and influence (Brass & Burkhardt, 1993), promotion advantages (Burt, 1992, 1997) and performance benefits (Mehra, Kilduff, & Brass, 2001).

The magnitude of social network returns depends on features of the network structure. According to Burt (1992) one beneficial feature is to occupy a structural hole. This concept describes gaps in a social structure that would appear if the person who occupies such a structural hole would be removed. In general, individuals who occupy structural holes benefit from career advantages (Burt, 1992; Podolny & Baron, 1997) or better work performances (Oh, Choi, & Kim, 2005; Zaheer & Soda, 2009). However, Burt (1998) points out that there are differences for the genders regarding structural holes. His results indicate that men are successful by occupying as many structural holes as possible, while women have a higher success by spanning networks that concentrate on a strategic partner.

The results of newer studies indicate that Burt's claim (1998) regarding the different network outcomes for men and women is not necessarily true. Gargiulo, Ertug and Galunic (2009) examine predictors of employee success, measured by received bonus payments, in a big financial company. In their sample, they cannot find gender-specific differences: women with the same network structures as men have the same success. Liu (2015) uses panel data of tourism scholars in order to measure, among other things, the effect of structural holes on research productivity. They measure productivity of individuals by the number of academic journal publications. The gender of a person is only used as a control variable, but the results do not show significant differences between men and women. This indicates that at least in some circumstances, women do not need a different network structure in order to be successful. Therefore, it is an open question whether women have the most objective career success with the same network structure as men (Bierema, 2005; Gargiulo et al., 2009), or whether women need a different network structure to achieve the best career results (Burt, 1998).

My second study (Schoen et al., 2016) uses this contradiction as a starting point. By comparing the network structure of men and women in different faculties, it turns out that the proportion of women plays an essential role for network outcomes. The study can solve the contradictory findings, and shows that women need a different network structure when there are very few other women around. This changes when the ratio of men and women becomes more balanced; then women are successful with the same network structure as men.

1.4.3 Innovative approaches

As explained in the introduction of this thesis, the careers of individuals have changed in the last years. Today, careers are marked by uncertainty and demand more flexibility compared to several years ago. Due to these changes, it is not surprising that career researchers, such as Sullivan and Baruch (2009, p. 1563), call for new ways to examine careers: *"The blurring of organizational, industry, and occupational boundaries; the escalation of technological developments; and rapid globalization have all contributed to a new work context, requiring fresh and innovative ways of examining careers."* My thesis follows this demand and uses several innovative approaches. In the following, I will present the existing issues of the methods used so far and how I can solve these issues.

In the first study, I compare the results of existing career studies in order to examine the promotion difference between men and women. This meta-analysis is not the first in the

career field, but it is the first one with a focus on promotion differences of men and women. The most related study is the meta-analysis of Ng, Eby, Sorensen and Feldman (2005). The authors review 140 articles to find predictors of objective and subjective career success. I briefly want to describe two main limitations of their work: First, they identify gender as a variable that is responsible for career differences, but they do not investigate the causes for this. From their study it is not possible to draw conclusions about which variables affect different promotion patterns for men and women. Second, Ng et al. (2005) do not investigate and control for a reporting bias in the literature. A reporting bias is the result of studies that have not been published, for example, because their findings oppose the mainstream results or are in contrast to common theories. Authors of such deviating studies often do not believe in their own results or face barriers in publishing because of rejections by journals (Doucouliagos, Laroche, & Stanley, 2005). If this is the case, studies that report no female disadvantage would less likely exist, and female discrimination would be an artifact. Therefore, a reporting bias can influence the perception of common knowledge. By controlling for the reporting bias, meta-analyses on other topics have revealed that specific coherences are wrong or do not exist (Dalton, Aguinis, Dalton, Bosco, & Pierce, 2012; Stanley & Doucouliagos, 2012).

In my first study (Schoen, 2016), I can resolve both shortcomings: First, the study has a focus on gender and therefore it can investigate the causes for career differences. Second, I control for the existence of a reporting bias. On the one hand, this allows me to check whether some results are missing in the literature. On the other hand, it also allows me to examine whether the female discrimination is only an artifact of missing studies.

The second study (Schoen et al., 2016) aims to compare social networks of individuals in academia. Empirical literature that examines the effect of social networks on careers is scarce and evidence mostly exists for business organizations (see for example Brass, 1985; Burt, 1992; Ibarra, 1997; Seibert, Kraimer, & Liden, 2001). For the area of academic careers, social networks play, at best, a minor role in the literature.[3] This is a mistake, because in the case of academic careers, innovation seems to play a major role for success – areas for which the network position has proven to be important. With personnel records from a big electronic company, Burt (2004) shows that individuals who span structural holes are more likely to generate innovation than individuals who do not occupy such holes. Individuals spanning

[3] Please consult the few existing studies of McBrier (2003), Sabatier (2010) and Jungbauer-Gans and Gross (2013), who all merely use proxies to capture the social network.

structural holes have better ideas and are more likely to express them (Burt, 2004). Further, Oh et al. (2005) use a sample of 1573 articles, written by 3411 academic authors in the science of management to examine the effect of structural holes. The authors show that spanning structural holes has a positive influence on the numbers of citations scholars receive. Therefore, a social network analysis seems to be a promising approach to examine success in the academic career.

A difficulty in the network research is to gather reliable data for ties between individuals. A common approach is to generate social networks by using questionnaires. However, this approach is often linked with some issues. The first issue is that questionnaire data may lead to endogeneity. For example, an error can arise when the true structure of the network is not captured, because often "*respondents are required to nominate a fixed number of others*" (Carpenter, Li, & Jiang, 2012, p. 1350). The second issue, as Carpenter et al. (2012) further explains, is that most studies on networks suffer from the problem of non-random sampling. For example when a study uses the snowball sampling method, well-connected actors are oversampled and the results are biased.

Summing it up, two shortcomings stand out: First, the network approach is seldom used, but enhances innovation and is likely to be an important predictor for the academic career. Second, network studies are likely to suffer from sampling issues, and good methods to measure networks are necessary. In a gender context, Park (2007, p. 471) formulated the following related research call: "*Second, social network variables such as co-author or project participation will provide a better understanding of the mechanism creating sex differences in academic productivity and its effects on job prospects.*"

I follow and extend this suggestion. In the second study (Schoen et al., 2016) I use social network variables that are relevant for a career in order to examine differences between men and women. I renounce the use of questionnaires and instead use four objective data sources: co-authorship between researchers, mutual teaching duties, committee memberships and research group memberships. This has the advantage to run less likely into problems of endogeneity and non-random sampling. The use of co-authors to create a social network has been done by other researchers before, but has not yet so far been used to examine career success (e.g., Balconi, Breschi, & Lissoni, 2004; Liu, 2015; McFadyen & Cannella Jr, 2004; McFadyen, Semadeni, & Cannella Jr, 2009). To the best of my knowledge, the other three sources to capture a social network have not been used before, at least not in the career

context. Therefore my second study[4] (Schoen et al., 2016) makes use of the promising social network approach and gathers a very unique sample.

The third study (Schoen et al., 2015) introduces a whole new measure for the effort of managers. To understand the contribution of this new measure properly, I need to clarify the function of promotions and the research context. One function of promotions is to motivate employees. For individuals who are on their way to the top, promotions are an incentive to invest effort and to contribute to the organizational success (Luhmann, 2000). For managers who have reached the top, this incentive ceases to exist and the motivation to invest effort in the firm becomes a complex issue.

How to motivate top managers or especially the chief executive officer (CEO) has been discussed for a long time in the literature (e.g., Fama & Jensen, 1983; Garen, 1994; Rosen, 1990). Leading an organization is a multi-dimensional job, with many different tasks (Prendergast, 1999). In this complex setting, it is easy for the managers to follow their own interests, such as to shirk or to maximize their own income under the given conditions (Jensen & Meckling, 1976). Therefore, it is an interesting topic, for researchers as well as for organizations, to investigate the effort a manager invests in the firm. The "solution" to do this, is to take the firm performance as a proxy for effort (Anderson & Reeb, 2003; He, 2008; Prendergast, 1999). Firm performance is typically measured by accounting returns or market performance (Post & Byron, 2015). However, although often used, firm performance is a rather weak proxy for measuring the manager's true effort: First, firm performance is a noisy signal, because the top manager is only responsible for the performance to a small degree (Morck, Shleifer, & Vishny, 1990). Second, CEOs might have incentives to maximize short-term revenues, rather than long-term performance, due to incentive systems with short time horizons (Prendergast, 1999). The firm is then successful in the short run, but might run into serious problems in the long term. Third, performance measures can be manipulated and agents have an interest to generate better results than the true value in order to influence their income positively. (Please see Schoen et al. (2015), for a more detailed explanation of these problems.)

[4] I wanted to integrate a measure for social networks in my first study (Schoen, 2016) as well. This failed because there have been too few studies combining social networks with objective career success in an appropriate regression analysis. Further, studies use very broad and different definitions for social networks. For example, Garavan, O'Brien, and O'Hanlon (2006) mix mentoring with network activities in their questionnaire-based study. Another issue is that some studies use very simple measures to cover social networks: For example, Sabatier (2010) uses the membership of academics in a professional body as a measure for having network activities.

The third study (Schoen et al., 2015) presents a different but innovative approach to measure the effort a manager invests and to solve the above-mentioned issues. The idea is to look at the leisure activity of the manager as a mirror image for the effort s/he invests in the firm. Due to time constraints, the more time a manager spends on leisure activities, the less time s/he can invest in the firm *ceteris paribus*. Malmendier and Tate (2009) point out that one could view golf handicaps as a suitable measure for the time a manager spends on leisure activities. The golf handicap represents the playing potential of a golfer and has the great advantage of being directly observable and comparable. It is important to understand that a handicap does not increase by playing some golf courses with friends or business partners. The handicap can only be improved by time-consuming and intensive training. Therefore, the golf handicap is used as an indirect objective measure for managers' effort. The design of the study concentrates on position changes of managers. A position change has the great advantage that the characteristics of the switching individual stay the same, but the incentive to invest effort changes with the position. Therefore, changes in the handicap are likely to be a result of the position change of the manager and her/his incentives to invest effort.

1.5 Amount of personal contribution to the respective studies

In the first study (Schoen, 2016) of this thesis, I am the sole author and therefore fully responsible for the content. The second study (Schoen et al., 2016) and the third study (Schoen et al., 2015) are developed together with co-authors. I am the first author in both studies and contributed the largest parts. In the second study (Schoen et al., 2016), Katja Rost is the second and David Seidl the third author. In the third study (Schoen et al., 2015), Thomas Ehrmann and Katja Rost are second and third authors, respectively.

Basically it is not easy to define, who has done which contribution, because the studies have been shaped through mutual exchange between the authors. Nevertheless, in the following I will explain in detail as well as possible, my contributions and the contribution of my co-authors: In both concerned studies I am responsible for most parts of the empiric analysis. This entails the gathering and editing of the data, as well as carrying out the regression models. None of the here-presented studies are based on existing complete datasets, such as a panel dataset. Instead, the data come from different sources and have been merged manually. For example, in the second study (Schoen et al., 2016), the network has been generated from official university lists and databases, and the career information is either extracted from the professors' curriculum vitae or from official university information. In the third study (Schoen et al., 2015) the source of the golf handicap is the Swiss business journal *Bilanz*, the source of

information regarding the companies are the respective annual reports, and the information regarding the career of the top-manager is extracted from their curriculum vitae or from company reports. I coded and merged most of the data. However, the co-authors have given important inputs regarding the collection and the analysis. Especially in the second study (Schoen et al., 2016), Katja Rost has given important input regarding the analysis and the interpretation of the data.

Furthermore, I have collected and crafted the biggest parts of the argumentation, the theory and the hypotheses. However, in the second study (Schoen et al., 2016) Katja Rost and David Seidl have been vital for the theoretical orientation: They made suggestions for the focus and the direction of the study. Further, they have helped to restructure and edit all parts. In the third study (Schoen et al., 2015) Thomas Ehrmann developed the first drafts of the theory and derived the mathematical model. I developed both further. Katja Rost helped with editing and improving the whole paper.

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2 Is there a gender promotion gap? A meta-analysis on 30 years of research

Constantin Schoen[1]

Abstract

This meta-regression addresses the question regarding the existence of a career promotion difference between men and women, and which predictors influence the magnitude of a potential difference. The study distinguishes for several kinds of promotion success, e.g., speed of promotion, number of promotions or reached upper position. The results of the analysis of 107 studies show that there is a significant female disadvantage, which is independent of the measure of promotion success. There is also evidence of a reporting bias, meaning that the promotion gap is exaggerated, because studies with weak or unconventional findings are missing in the literature.

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2.1 Introduction

In the last decades, there has been considerable progress with respect to gender equality, but still women are underrepresented in high-status positions and their proportion is increasing slowly (Catalyst, 2014; EU, 2012; GrantThornton, 2013; Helfat, Harris, & Wolfson, 2006; King, Hebl, George, & Matusik, 2010). This study addresses the issue of having a small number of women in upper positions, by focusing on the career differences of women and men on their way to the top.[2] The reasons for the underrepresentation of women in upper positions are the subject of many political and academic debates, with several different views (e.g., Cox & Harquail, 1991; Fietze, Holst, & Tobsch, 2011; Kirchmeyer, 2005, 2006).

Most academic authors report that women compared to men have fewer advancement opportunities (Litzky & Greenhaus, 2007; Ragins, Townsend, & Mattis, 1998), fewer promotions (Addison, Ozturk, & Wang, 2014; Lyness & Judiesch, 1999), a slower promotion rate (Ginther et al., 2009; Sabatier, 2010) and receive less career support (Helfat et al., 2006; Ragins et al., 1998; White, 2004). These results represent the dominant findings regarding career differences between the genders, and can explain the underrepresentation of women in upper positions. However, not all studies report a promotion gap (e.g., Booth, Francesconi, & Frank, 2003; Dencker, 2008; Gayle, Golan, & Miller, 2009; Ginther et al., 2009; Pema & Mehay, 2010; Tang, 1993). Among some researchers there is the belief that the inclusion of more relevant factors such as independent variables lowers the estimated discrimination until it vanishes (Stanley & Jarrell, 1998). Following this argument, researchers who report no gender difference might have included enough relevant variables, so that the gap has vanished.

This raises two main questions: First, are the findings of most career studies correct, and is there a unique gender promotion gap? Or is it rather the case that most studies do not include enough relevant variables? A subsequent question that arises: Is there a reporting bias in the academic literature because findings that are not in line with the dominating view are missing? Expectations can play an important role here. Researchers expect to find such a gap, because most former studies report a gender difference. This expectation can influence their own study (Rosenthal, 1964; Stanley & Jarrell, 1998; Thornton & Lee, 2000). Similarly, reviewers and editors might be less likely to publish a study reporting no gender gap because

[2] Please note that my work only refers to the genders female and male. The reason my work ignores other gender identities, such as transgender, pangender, etc., is not ignorance or disrespect – it has to do with the way a meta-analysis works: I can only differentiate for characteristics that former studies have made. This research field differentiated so far only between men and women.

they expect the researcher to have made errors. As a result, studies reporting no gender promotion gap could be underrepresented in the literature.

I try to shed light on both questions by comparing gender promotion differences of more than 100 studies in the last 30 years of research. So far, there have been meta-analyses for the gender wage gap (Jarrell & Stanley, 2004; Stanley & Jarrell, 1998; Weichselbaumer & Winter-Ebmer, 2005) or for mentoring differences between the genders (O'Brien, Biga, Kessler, & Allen, 2010), but a meta-analysis regarding the gender promotion gap is missing. With the use of a comprehensive meta-regression, I make four contributions to the literature: First, I examine the existence of a gender promotion gap. By using a partial correlation coefficient and a measure for the effect size of studies, I can determine the magnitude and the direction of a gap. Second, I explore whether or not there is a reporting bias. To uncover the existence of a reporting bias I use a *funnel-plot test* and a *funnel-asymmetry test*. Third, I investigate which variables are important regarding career differences and should be included in career studies. An advantage of the used meta-analytical approach is that variables that are important for the magnitude of the gender promotion difference are identified. I use two career mobility perspectives as the framework for career variables. And fourth, I compare study characteristics that are relevant for the gender promotion gap. The identification of important career variables and study characteristics is an important contribution to the literature, because "*a theoretically grounded understanding of why and under what conditions men experience more objective career success than women*" is still missing (Greenhaus & Callanan, 2013, p. 598). Knowing which variables and which conditions are really important for the gender promotion gap can help to develop a better theoretical understanding of this topic.

2.2 Theoretical background

2.2.1 Gender promotion gap

The gender promotion discrimination occurs when two comparable persons who show the same performance and qualification characteristics receive different promotion outcomes just because one is male and the other is female. If such a difference is systematic, a gender promotion gap emerges. The academic literature on career differences is characterized by many approaches and theories with the aim to analyze the career differences between the genders and to explain the disadvantage of females. One perspective argues that women face negative stereotypes. Heilman (e.g., 1983, 1997, 2001, 2012) has done a lot of research in this

field and examines how stereotypes affect career. She defines stereotypes as "*generalizations about groups that are applied to individual group members simply because they belong to that group, and gender stereotypes are generalizations about the attributes of men and women*" (Heilman, 2012, p. 114). Stereotypes can create a negative expectation of female performance in general. For example, the stereotype creates expectations that women are less likely to have the necessary characteristics and attributes to be successful in high-level positions (Heilman, 1983; Hoobler, Lemmon, & Wayne, 2014; Johnson, Murphy, Zewdie, & Reichard, 2008; Schein, 1973, 1975). Positive information or performance that deviates from negative expectations is more likely not noticed or not remembered, and has consequences for promotion decisions (Heilman, 2012; Lyness & Heilman, 2006). This theory is similar to the expectation states theory. Gender is a status characteristic in the expectation states theory, with effects on evaluations and inferences on competence (Berger, 1977; Foschi, 1996; Foschi & Valenzuela, 2012; Wagner, Ford, & Ford, 1986). Even when both sexes perform equally in task groups, women are held to stricter standards and get less positive evaluations (Foschi, 1996).

The degree to which a woman is characterized stereotypically depends on personal attributes and structural factors (Heilman, 2012). Such a structural factor can be the minority or token status of women. The token status refers to women being in a skewed group that has a proportion of less than 15% (Kanter, 1977b). Kanter (1977b) identifies three main disadvantages from being a token: first, tokens are more visible and under more performance pressure than non-tokens (Kanter, 1977b; Roth, 2004). Second, the majority group can easily exaggerate the differences between itself and the skewed group, because tokens are too few to prevent stereotypes (Kanter, 1977b). The result of this is that tokens are isolated and prevented from gaining equal access to elite or important networks (Brass, 1985; Forret & Dougherty, 2004; Kanter, 1977b). Third, tokens are associated with *assimilation* or *role encapsulation* meaning that men, as the majority, have specific distorted expectations of how women behave and of the abilities they possess (Kanter, 1977b). In short, the token status leads to a more stereotyped characterization of women (Kanter, 1977a, 1977b). The token status of women therefore leads to biased performance evaluations (Pazy & Oron, 2001) and promotion disadvantages (Sackett, DuBois, & Noe, 1991).

A further theory regarding promotion differences between men and women is the statistical discrimination. Signals and socio-demographical characteristics play an important role for the career development. The statistical discrimination describes that employers have imperfect

information regarding employees and treat individuals based on average behavior of the group they belong to (Arrow, 1971; Phelps, 1972; Spence, 1973). In this perspective employers might expect that it is more likely for women than it is for men to invest less time and effort to work activities (Becker, 1985; Noonan, Corcoran, & Courant, 2008). As a result, women receive less career opportunities, especially in jobs where tasks are more complex and the organizational structure reflects male values (Acker, 1990). Summing up common theories regarding the discrimination of women in the workplace, it seems likely that there is a true promotion disadvantage for women, resulting in a gender promotion gap.

Hypothesis 1: *There is a gender promotion gap that discriminates against women.*

2.2.2 Reporting bias

Apart from the theory presented so far, there are several studies that do not find a gender promotion gap (e.g., Booth et al., 2003; Dencker, 2008; Gayle et al., 2009; Ginther et al., 2009; Pema & Mehay, 2010; Tang, 1993). Many former meta-regression analyses on other topics than gender have revealed that certain effects and coherences that are thought to be common knowledge, do not exist or have a very small effect size because they are the consequence of a reporting bias (Dalton, Aguinis, Dalton, Bosco, & Pierce, 2012; Stanley & Doucouliagos, 2012). The gender discrimination regarding careers could be such a case as well. A reporting bias is a result of publication selection, due to unpublished studies and is likely to be found where mainstream theories expect a particular effect (Doucouliagos, Laroche, & Stanley, 2005): On the one hand there is a general preference or tendency of researchers to report statistically significant results, while non findings or small effects are not published (Dalton et al., 2012; Stanley & Doucouliagos, 2012). On the other hand, reviewers and editors are more likely to accept papers that are consistent with former findings, while there is a reluctance of researchers to report findings that are not in line with the prevailing view (Doucouliagos & Paldam, 2009; Stanley & Doucouliagos, 2012). The reason for this is that research findings have a socially constructed element (Orlitzky, 2011). Theories and knowledge do not grow in a vacuum, but instead are influenced by cultural beliefs (Orlitzky, 2011). Values, norms and social networks influence the cognition of scholars and shape a common understanding of certain topics (DiMaggio, 1997). Transferred to the gender promotion gap this could imply that scholars might structure their research with the expectation to find a female promotion disadvantage. Studies that reject the general wisdom or counter the prevailing view are less likely carried out and published. Overall, the result would be an overrepresentation of large and significant effects in the literature, often in line

with a dominating theory. The absence of results that are contrary to the major findings would lead to a bias in the literature and exaggerate the female career disadvantage. Therefore, the second hypothesis is that the gender promotion gap is overestimated, because studies that do not find a female disadvantage are less likely published.

Hypothesis 2: *The magnitude of the gender promotion gap is exaggerated in the literature due to a reporting bias.*

2.2.3 Contest mobility and sponsored mobility as two different career perspectives

So far the focus has been to examine the existence of the gender promotion difference. Now, I want to take a more detailed look at career differences and variables that potentially measure and explain the gender promotion differences. For the analysis of the career gap it is important to include the relevant variables to ensure that both genders are comparable. When important predictors for career success are missing, the gender difference could be only an artifact. In the following, I introduce important variables and approaches of career research and make use of Turner's (1960) mobility system to sort predictors. Turner (1960) introduces two different systems of upward mobility in society: contest mobility and sponsored mobility. The view of contest mobility is that everybody competes on an equal footing for upward mobility, as in sport competitions. The ones who demonstrate the greatest performance in this fair contest will receive victory i.e., get promoted to the top. "*Enterprise, initiative, perseverance, and craft are admirable qualities if they allow the person who is initially at a disadvantage to triumph. Even clever manipulation of the rules may be admired if it helps the contestant who is smaller or less muscular or less rapid to win*" (Turner, 1960, p. 857). In contrast, sponsored mobility, is more like a controlled selection process. The people in power determine who have the appropriate qualities to obtain upward mobility. "*In this process the elite or their agents […] choose individuals for elite status who have the appropriate qualities. Individuals do not win or seize elite status; mobility is rather a process of sponsored induction into the elite*" (Turner, 1960, p. 857). The idea is that the best results are achieved by sorting talents with high potential into their proper niches (Turner, 1960). The decision-makers choose those individuals who are deemed to have the most potential to perform and provide these individuals with career support (Ng, Eby, Sorensen, & Feldman, 2005). Once an employee is chosen, s/he receives treatment which helps her/him to be better and to differentiate from the non-chosen employees (Ng et al., 2005). Managers can be seen as gatekeepers to subordinates' success and provide valuable resources only to chosen employees (Hoobler et al., 2014).

Originally Turner (1960) creates these perspectives to describe differences in the upward mobility between societies. Rosenbaum (1984) transfers this concept to careers in organizations and explains that neither systems excludes the other. Instead, the two systems should be seen as additive and organizations should incorporate both perspectives (in different magnitude) in their career system (Ng et al., 2005; Wayne, Liden, Kraimer, & Graf, 1999). Variables that are frequently used to predict career success can be allocated to these two perspectives. This guides and enhances the understanding of career variables and puts the variables in a common framework (Ng et al., 2005). Measures for human capital, and individual performance are allocated to the contest mobility perspective, while "*organizational sponsorship and socio-demographic status are the most commonly used predictors in the sponsored-mobility model*" (Ng et al., 2005, p. 370).

2.2.3.1 Contest mobility

In the contest mobility perspective, human capital is the essential resource to climb up the career ladder. The most skilled and most willing employees, i.e., those who accumulate the most human capital, are thought to win the career contest (Ng et al., 2005). The term human capital unites investments that improve the work capabilities of human beings (Schultz, 1961). Typical indicators of human capital, such as educational degrees or job experience, measure the potential performance of an individual (Smith-Doerr, 2004). The measures of human capital explain a lot of variation regarding career differences (Becker, 1992; Jones & Makepeace, 1996; Pema & Mehay, 2010). For example Altonji and Blank (1999) show that education and job experience are major variables to explain objective career differences between men and women. As a result, studies that do not include human capital variables are likely to report larger career differences because the endowment of human capital is a major predictor for career success.

In addition to the potential performance, some studies also measure the actual performance of an individual in the current job, which corresponds to the core idea of the contest mobility system (Rosenbaum, 1984). Individuals who show a higher performance should receive more and faster promotions, compared to the low performer. For example, Cable and Murray (1999) illustrate that the academic publication record of individuals is part of the contest-mobility perspective. They used the researcher's publication performance to draw conclusions regarding her/his job performance and showed that this is a valuable predictor of career success. Lyness and Thompson (2000) argue that women, compared to men, should benefit more from having good records of successful accomplishments. Stereotypes can influence the

selection decision of individuals and are used as an information shortcut (Iversen & Rosenbluth, 2011; Macrae, Milne, & Bodenhausen, 1994; Powell & Butterfield, 1994). However, when the individual actual performance of an employee is captured, superiors are provided with better information and it is less necessary to use stereotypes as an information shortcut (Tosi & Einbender, 1985). As a result, studies that include employees' performance should report less career disadvantages for women.

Summing it up, studies that control for variables of the contest mobility perspective should be more precise, use better information and therefore report a smaller gender career gap.

Hypothesis 3: *Studies that include variables of the contest mobility perspective report a smaller gender promotion gap.*

2.2.3.2 Sponsored mobility

The sponsored mobility perspective describes that decision-makers choose individuals who are likely to advance in the organization and support them with additional resources. This perspective can be divided into two aspects: First, the chosen employees receive career support. And second, demographic characteristics can determine who is likely to be chosen.

Mentoring is a very common form of career support and a part of the sponsored mobility perspective (Wayne et al., 1999). Mentoring is described as a set of activities and roles that include sponsorship, coaching and support (Kram, 1988). Individuals who receive mentoring activities are the ones who achieve the greatest career success (Lyness & Thompson, 2000; Ng et al., 2005). Kammeyer-Mueller and Judge (2008) conduct a meta-analysis with the focus on the effects of mentoring on career success, and include 113 distinct publications in their analysis. They show that having a mentor is significantly related to positive career outcomes. This underpins the claim of the sponsored mobility lens that it is an advantage for employees to be among the supported individuals.

But who are the ones receiving support? The principle of homophily can help to explain this second aspect of the sponsored mobility perspective. Homophily predicts that individuals prefer to interact with others who are similar to them on salient characteristics such as gender and ethnicity (Ibarra, 1992; McPherson, Smith-Lovin, & Cook, 2001). Similarity increases the likelihood that worldviews and interests are alike, which simplifies communication, enhances trust and makes behavior more predictable (Ibarra, 1992; McPherson & Smith-Lovin, 1987). As a result, the individuals who are dominating the upper hierarchies are more likely to interact more successfully with individuals who are similar to them. Following the homophily

argument and because other men are dominating the higher ranks (GrantThornton, 2013; Helfat et al., 2006), women have a lower likelihood to be chosen from the elite to receive career support. Ragins and Cotton (1991) analyze, with the help of surveys, 510 employees in three US research and development organizations and find that women report greater barriers to obtain a mentor than men do. Women are more likely to face restricted access to potential mentors, with unwillingness of mentors to enter a relationship and with problems in the relationship. One reason for these results is that women have a higher need to develop cross-gender relationships (Ragins & Cotton, 1991). Lyness and Thompson (2000) build matches of men and women working in a large financial service corporation. They find that mentoring less likely facilitates women's career success compared to men's career success. The results of both studies support the homophily argument and indicate that women receive less mentoring and also benefit less from it. For this reason, I expect that studies that include mentoring report smaller gender promotion differences.

As already mentioned, socio-demographic characteristics influence the likelihood of employees to receive career support. Apart from gender, other demographics such as ethnicity, marital status and children, belong to the sponsored mobility perspective as well (Ng et al., 2005). Similar to gender, ethnicity is a person's salient characteristic (McPherson et al., 2001; Tsui, Egan, & Oreilly, 1992), and due to the tendency for homophily, it is harder for ethnic minorities to initiate, manage and maintain mentor-protégé relationships (McPherson et al., 2001; Thomas, 1990). As a result, it is less likely for them to be supported by higher-level decision-makers. This disadvantage opens up the question of a double liability for women belonging to an ethnic minority, in the sense that they suffer from being female and ethnically different at the same time (Cobb-Clark & Dunlop, 1999; Landau, 1995; Shenhav, 1992). Landau (1995) shows that black and Asian women are penalized regarding their ratings of promotion potential, on the one hand for being female and on the other hand for being racially different. Therefore, the control for ethnicity has the potential to lower the gender career gap, because otherwise ethnic differences might be covered by the gender variable alone.

Further, other demographic characteristics can lead to less career support as well. Disadvantages can occur for women with children or women who take a temporary leave, for example to care for relatives. Family responsibilities can work as a negative signal for decision-makers, because they could expect that such women have a higher likelihood of working part-time or of contributing less to the company success (Burke & McKeen, 1996;

Chen, Veiga, & Powell, 2011; Spence, 1973). While on average it is true that women work more often in part-time jobs or leave the job market temporarily, it is an unjust generalization to expect this behavior from individual women in general and to expect a lesser performance of women (Bielby & Bielby, 1988). Such behavior of decision-makers is part of the already-described statistical discrimination theory, but narrowed on women with family responsibilities. To expect a lesser work effort from specific women restricts their career chances and can lead to a self-fulfilling prophecy (Aigner & Cain, 1977; Bielby & Baron, 1986). Women who receive or who anticipate receiving less career support, might choose to invest less time in their career as a counter-reaction. They might decide to work part-time or take a (further) leave, fulfilling the initial expectation (Bielby & Baron, 1986; De La Rica, Dolado, & Vegas, 2015; Spurr & Sueyoshi, 1994). In this sense, family responsibilities work as a signal and women might receive less career support and do not become sponsored individuals.

Summing up the arguments and the effects of the sponsored mobility perspective, variables related to this perspective might lower the gender career gap: Mentoring, as the most common kind of support, is associated with greater career success (Dreher & Ash, 1990; Kammeyer-Mueller & Judge, 2008; Underhill, 2006), but women are less likely chosen for mentoring (Lyness & Thompson, 2000; Ragins & Cotton, 1991). Studies without a mentoring variable, could find a larger gender promotion gap, because mentoring is an important element that explains career differences. Also, ethnic minorities are less likely chosen, putting ethnic minority women in a situation of a double liability (Cobb-Clark & Dunlop, 1999; Landau, 1995; Shenhav, 1992). The career disadvantages of non-white women would be erroneously exaggerated by the gender variable alone. The same is true for family responsibilities, because it works as a negative commitment signal to decision-makers (Chen et al., 2011).

Hypothesis 4: *Studies that include variables of the sponsored mobility perspective, report a smaller gender promotion gap.*

2.2.4 Time effects

Apart from variables used in the studies, the examination of study characteristics in a meta-analysis can add new information to the research field (Stanley & Doucouliagos, 2012). An important variable is the research date of a study. In today's workforce, women are much more present than some decades ago (GrantThornton, 2013). This increasing share is expected to have a positive influence for the female career and it seems likely that the career of both

genders will converge (Hull & Nelson, 2000). Kanter's (1977a) token theory suggests, that women have several disadvantages in the workplace when their proportion is very low. When the proportion of women in the workforce increases, attitudes change and stereotypes are likely to fade, which in turn leads to changes in the way individuals are seen and evaluated (Azmat & Petrongolo, 2014; Kanter, 1977b; Snizek & Neil, 1992). These findings are in line with Cota and Dion (1986) who argue that the role of gender is more important in situations where women are underrepresented. It is reasonable that a greater share of women in upper levels work as a signal to other women, and that women are capable of reaching upper positions (Ely, 1994). Therefore, the increasing female share in the workforce and in upper positions is likely to narrow the gender promotion gap. Moreover, a declining gap over time has been found for the gender wage discrimination (Stanley & Jarrell, 1998), which suggests that a declining difference is also likely for promotions.

Hypothesis 5: *More recent studies report a smaller gender promotion gap because women are more present in the workforce and upper positions.*

2.2.5 Gender background of the study

Finally, I want to consider the influence of gender as a study characteristic. Two different perspectives are evaluated: First, does a focus on gender in the study have an influence on the research outcomes? And second, does the gender of the authors affect results? Researchers are exposed to the *Pygmalion effect* (Rosenthal, 1966). This effect describes that the expectations of researchers can influence the research outcome, because the behavior of subjects is consciously or unconsciously affected by expectations (Rosenthal, 1964; Thornton & Lee, 2000). Similar to the self-fulfilling prophecy, the prophecy of an event changes the behavior in such a way that the predicted outcome becomes more likely to appear (Merton, 1948). Rosenthal and Fode (1961) conduct one of the first expectancy research studies. They examine the effect that the experimenter's expectation has on evaluations of raters. In this study participants had to rate the success of people. When experimenters expected higher ratings from the participants, the participants in fact rated the people significantly higher compared to experimenters who expected low ratings from the participants.

The *Pygmalion effect* appears because researchers include variables, and choose model specification and datasets that follow their expectations and that are not random (Rosenthal, 1964; Stanley & Jarrell, 1998; Thornton & Lee, 2000). A researcher's expectation can be affected by the former research, own experiences and the theory researchers use (Stanley &

Jarrell, 1998). Therefore, studies that use a theory with a focus on gender are more likely to find a gender career gap, because most gender theories in career research try to explain differences between men and women and therefore implicitly create the expectation to find a gap. Even when the researcher is perfectly neutral and is not biased by expectations, studies with a gender focus are still more likely to present a gender gap, because editors or reviewers are less likely willing to publish a study presenting a gender theory without results that fit into the presented theory (Thornton & Lee, 2000). Therefore, studies that use gender only as control might report smaller differences in career outcomes, because researchers do not expect that differences appear.

Hypothesis 6a: *Studies with a gender focus report larger gender promotion gaps because this focus influences the expectations to find a promotion difference.*

Further, the gender of the authors is likely to have an effect on expectations as well. Eagly and Carli's (1981) early meta-analysis finds that the researcher's gender had a significant influence on results: They investigate the persuasibility and conformity differences between men and women, and find that the outcome of studies differ in respect to the proportion of male authors. Weichselbaumer and Winter-Ebmer (2005) confirm that the author's gender affects outcomes. In their meta-analysis they compare salary differences between men and women and they report significant evidence that female authorship influences the estimates of studies. Transferred to my research, I expect an effect for the gender composition of authors as well. Expectations regarding the outcomes might differ for men and women. Because the literature typically report disadvantages for women, it could be the case that female authors identify with this disadvantage and feel attached to women as a discriminated group. Therefore this could lead to an unconscious expectation to find adverse promotion effects.

Hypothesis 6b: *Studies with female-only authors report larger gender promotion gaps because the female researchers expect to find these.*

2.3 Methods

2.3.1 Literature Search

For the literature research, first I consulted prior meta-analysis and literature reviews in the area of careers. This procedure brought up relevant studies and helped to differentiate from existing meta-analysis. Next, I began a keyword search of EconLit, Google Scholar, JSTOR, Sciencedirect and Web of Science using and combining career and gender related terms: The following keywords have been used with different combinations: *career, career gap, career*

speed, promotion, career advancement, career progression, career advancing, career attainment, objective career success, managerial level, promotion rate, gender, and *discrimination*. The keyword search was altered until keywords did not result in the finding of new studies. Forward and backward citations of collected studies were used to find further relevant publications. I searched Dissertation Abstracts International, SSRN and conference programs (such as the Academy of Management) and contacted researchers directly to find unpublished studies. The final sample includes 107 empirical studies, with overall 498 usable estimates, which contains information about gender and career advancement.

2.3.2 Decision of inclusion

Several elements determine whether studies are to be included: (i) A first criterion is the possibility to create a partial correlation coefficient. The partial correlation coefficient measures strength and direction of an association between two variables, but holds the other variables constant (Stanley & Doucouliagos, 2012). In other words, the estimate is derived from a regression analysis and studies must have a gender regression coefficient to be included.

(ii) Studies with gender as independent variable and a measure of promotion success as dependent variable are included.[3] Not included are studies in which subjective career outcomes or salary are used as a dependent variable. Subjective career indicators measure the individual career satisfaction. For analyzing the gender promotion gap, subjective career success seems to be less suited than objective measures because it is a less tangible measure of career success and more a measure of personal satisfaction (Allen, Eby, Poteet, Lentz, & Lima, 2004). Salary is not included, because salary and career advancement have an underspecified causal link and it is questionable to use both concepts synonymously for objective success (Chen et al., 2011). Ng et al. (2005, p. 392) show in their analysis regarding predictors of objective career success, that salary and promotions "*emerged as conceptually distinct constructs*".

[3] I exclude some studies with a specific career outcome measurement. In the preliminary regression models it turned out that some career success measures lead to significant different results than other outcomes. Thereupon I created different groups of outcome variables, regressed all models excluding one group and compared the results. It turned out that studies that use a dependent variable that measures whether a specific single individual did receive a promotion by the survey date (dummy variable), report significantly different outcome results compared to all other groups. Typically, these study data are gathered by calling companies and asking them about the last employee they hired and then asking whether this employee already received a promotion. This approach seems to be different from other studies that asked employees directly or used the promotion statistics of all employees of an organization. By using different dependent variables in a meta-regression, there is always the danger of comparing measures that are too different. In order to avoid this, respective studies were excluded. The results are available upon request.

(iii) All models in a study that included an effect estimation of the gender-career link have been used. If authors calculated several models in a single study all usable results are included. The advantage of this approach is a great number of observations that offers more estimates to explain variation and interaction effects, and prevents unintentional selection bias of the meta-analyst (Stanley & Doucouliagos, 2012). However, models with interaction effects between gender and other variables are not included. The reason for not including interaction effects is because the true effect size between gender and career is unknown when an interaction effect is calculated.

These rules assure that studies are comparable with each other even when they have used different measures for outcomes. Nevertheless, I had to leave out several career studies. The main reason is that studies did not include a regression analysis or did not report enough information to calculate necessary estimates.

2.3.3 Measures of key constructs

The dependent variable used in the analysis is the direction and the effect size of the gender career success link. The gender coefficient in a study's regression represents this link. I standardize different effect sizes by using the tool *Comprehensive Meta-Analysis*, which allows for different data formats (Borenstein, 2000). *Fisher's z*, the corresponding standard error and the z-value were computed. The z-values describe the effect size and are used as the dependent variable in the meta-regression-analysis. When women have career disadvantages, the values of this variable are positive. The larger the values, the larger are the disadvantages for women. Therefore, coefficients with a negative sign in the regression decrease the female disadvantage.

On the study level, I differentiate for several elements that might impact the results of a study and I create different groups of control variables: In the following I explain variables that are relevant for testing the hypotheses in detail. When a study reports several regression models, I separately code the controls for every model in a study. Other variables that are included in the model represent study characteristics and controls. Also I control for different methods of career measurements, i.e., different outcome variables studies have used. For space considerations I do not present these variables in detail here, but a description can be found in the appendix.

2.3.3.1 Contest mobility variables

For the contest mobility hypothesis I focus on variables of human capital and measures of performance. To control for human capital, *education* and *tenure* are two important and widely used measures (Becker, 1992, 2009; Ng et al., 2005; Smith-Doerr, 2004). I concentrate on these two measures, because these are most consistent between studies. When a regression model of a study controls for *education* or *tenure*, I code the respective variable with one, otherwise with zero. This coding approach is a common method for meta-regression studies (Stanley & Doucouliagos, 2012) and used for all following variables. Further, I code if the actual individual performance of a person is measured. In business firms, *individual performance* could be represented by sales or the turnover an employee is responsible for, or by evaluations an employee receives (e.g., Bergeron, Shipp, Rosen, & Furst, 2013; Bidwell, 2011). In academic studies the publication record, such as number of publications since graduation (e.g., Kirchmeyer, 2006) or articles published weighted by journal quality (e.g., Cable & Murray, 1999; Sabatier, 2010) are typical measures for performance.

2.3.3.2 Sponsored mobility variables

The sponsored mobility perspective includes a broad dimension of variables. Studies or regression models that control for any sponsoring activities in the sense that a subordinate receives coaching, advices and help from more experienced others, are coded as *mentoring*. *Ethnicity* is coded as one if at least one different ethnic background is included in the study. Further, some studies control for foreign people instead of ethnicity. For samples in Europe, this approach makes sense because foreign people face disadvantages in organizations in terms of careers, similar to Blacks, Asians or Hispanics in North America (Van den Bergh & Du Plessis, 2012; Yap & Konrad, 2009). Some argue that due to communication patterns and interaction styles, nationality is even more salient than ethnicity (Earley & Mosakowski, 2000). Therefore, studies that control for foreigners are also controlled with the *ethnicity* variable. The effects of family responsibilities are measured with two separate variables: *children* and *temporary leaves*.[4] If a study controls for the fact that an employee has at least one child, regardless how specific the number of *children* is measured, the variable is coded with one. A *temporary leave* is typically understood as a recorded employee's temporary leave of absence in the respective organization or from the job market. Typically, women use such leaves to give birth or to care for relatives.

[4] A third variable that has been coded for measuring family responsibilities is being married/having a partner. This variable has a high correlation to children (0.83). Therefore it has been excluded and children have been used, because the explanatory power of the first measure is higher.

2.3.3.3 Time-effect variables

I create five groups of years for the time from which a study takes its data from, to measure the effects of different time points. The groups are: *Y1970-1979, Y1980-1989, Y1990-1999, Y2000-2009* and *Y2010-2015*. Please note that I do not use the publication year of the study, but the year of the sample data, which can differentiate explicitly from the publication year. This design implicates that studies can belong to more than one group, for example when the observation of a study starts in 1988 and ends in 1995. There are eight studies (23 estimates) with a detailed history of past promotions before 1970 (one study began the observation in the year 1946). These studies serve as a reference category.

2.3.3.4 Variables that measure the gender background of the study

The variable *gender focus* controls for studies that focus on the gender differences in the theory. Studies that use gender only as control are coded with zero. The variable *author female* is coded with one for studies with only female authors.

2.3.4 Meta-Analytic Procedures

I employ several analytical approaches to test the hypotheses. First, the *funnel-plot test* and the *funnel-asymmetry testing* (FAT) have the aim to identify significant publication bias in the literature. Second, *precision-effect testing* (PET) has the aim to identify the true effect of gender on career outcomes. Third, to increase the validity of the results, three different approaches of weighting will be applied. In a meta-regression weighting has the aim to control for the precision of studies. In the sub-effect models, the precision of a study is weighted by either using a (i) random-effect model or a (ii) fixed-effect model. In these two models, different assumptions are made regarding the true effect of all studies and both models have their own advantages and disadvantages (Borenstein, Hedges, & Rothstein, 2007). The fixed-effect model assumes that all studies in a field of research have a common true effect size. In turn, the assumption under the random-effect model is that the studies are a random sample of the relevant distribution of effects and the true effect can vary from study to study. For example, the effect size might be different when the average age of the individuals in one study differs from the average age in a different study. The result of the random-effect model is that weights are more balanced and large studies (i.e., having more observations) are less likely to dominate (Borenstein et al., 2007). For analyzing the gender career gap, the random-effect model seems to be more appropriate: First, my analysis includes studies with different dependent variables and second, I have five estimates with a high number of observations having together a weight of 61.9%. The (iii) study-effect model, also

called clustered model, is a more conservative assessment of the meta-regression analysis. In this model I use cluster robust standard errors, with the aim to handle potential dependence among reported estimates and to avoid errors in the calculation of the t-values (Stanley & Doucouliagos, 2012). When the primary study provides multiple regressions of a relationship based on the same sample, I have clustered the results.

2.3.5 Funnel-plot test

A *funnel-plot* is a method to give a first overview regarding the true effect between two variables and the existence of a publication bias. This graphical test plots a study's effect size on the x-axis against its accuracy on the y-axis. *Fisher's z* allows the comparison of different types of studies and is used as effect size measure. The accuracy is measured as the estimated inverse of the standard errors of a study. The most precise studies are at the top of the graph and cluster near the mean effect size. In the case of selection bias, the distribution of studies is not symmetric (Borenstein, 2000). The *funnel-plot test* is a subjective interpretation about whether there is a true effect and a publication bias (Stanley & Doucouliagos, 2012).

2.3.6 Funnel-asymmetry testing (FAT) and Precision-effect testing (PET)

To verify the graphical interpretation a *funnel-asymmetry test* (FAT) and a *precision-effect test* (PET) is performed. These are more rigorous tests, because they correct for the reporting bias and try to find the true effect between variables by including the influence of other elements, such as various measurements, time periods, methods and so on (Doucouliagos & Stanley, 2009; Rost & Ehrmann, 2015; Stanley, 2005b). Omitted variables can cause false funnel asymmetry (Callot & Paldam, 2011), but can be adjusted in a regression-based method. This is the case when some researchers include a certain control variable, while others do not, the funnel becomes asymmetric (Callot & Paldam, 2011). The FAT approach regresses the inverse of standard errors ($1/SE_i$) on the effect size (z_i = *Fisher's z*-values) of a study as shown in equation 1 (Stanley & Doucouliagos, 2012):

$$z_i = \beta_0 + \beta_1 * 1/SE_i + v_i \quad (1)$$

The variance of the error term is approximately constant by being weighted (i.e., $v_i = \varepsilon_i / SE_i$). A constant β_0 that is significantly different from 0 indicates that there is a publication bias.

To test whether there is a significant empirical effect beyond the publication bias the slope of β_1 in equation 1 needs to be significant. The test is called *precision-effect test* (PET), because β_1 is the coefficient on precision by using the inverse of the standard error (Stanley & Doucouliagos, 2012). The coefficient on *1/SE* (β_1) is corrected for reporting bias effects, and

simulations have revealed that PET is powerful and robust to the reporting bias (Stanley, 2005a, 2008).

2.3.7 Heterogeneity

To control for heterogeneity it is recommended to include relevant independent variables and to regress a multiple meta-regression analysis (Stanley & Doucouliagos, 2012). Both, the selection bias and the authentic empirical effect are likely to depend on several variables. When studies omit respective variables, the true gender career gap might be exaggerated or underestimated (Stanley & Jarrell, 1998). Following the procedure of Stanley and Doucouliagos (2012) equation (1) is extended. The Z-variables measure the magnitude of the empirical effect and therefore, $\beta_1 * 1/SE_i$ is extended to $\beta_1 * 1/SE + \sum \beta_k Z_{ki} * 1/SE$. A unique gender promotion gap exists when the joint test of the inverse of the standard error and all Z-variables is different from zero. A positive (negative) β_k-coefficient indicates that the gap between men and women increases (decreases). The publication selection is now represented by $\beta_0 + \sum \beta_j K_{ji}$. To measure the publication bias a joint test of the constant and all K-variables is necessary, assuming that the constant and all of the K-variables are zero (Stanley & Doucouliagos, 2012). The equation used in this multi meta-regression analysis is as follows:

$$z_i = \beta_0 + \sum \beta_j K_{ji} + \beta_1 * 1/SE_i + \sum \beta_k Z_{ki} * 1/SE_i + v_i \quad (2)$$

2.3.8 Model adaptions: precision-effect estimate with standard error (PEESE)

For robustness checks, I consider an approach that uses the variance instead of the standard error to correct for publication bias (Stanley & Doucouliagos, 2007, 2011). This estimator is called *precision-effect estimate with standard error* (PEESE). In case of the existence of a publication bias, it is difficult to calculate unbiased estimates of the true empirical effect. The PEESE estimator is then recommended and delivers less biased results (Moreno et al., 2009; Stanley & Doucouliagos, 2007, 2011).

2.4 Results

2.4.1 Funnel-plot test.

Table 2.1 shows the descriptive results of the sample. The funnel plot is displayed in Figure 2.1. The standardized effect size (*Fisher's Z*) on the horizontal axis is regressed against its accuracy on the vertical axis. The figure shows a shift to the right, which assumes that there is a true effect between gender and career success, with career disadvantages for women. This is supported, by the most precise studies, because they are at the right of the *zero line*. These findings give first support for Hypothesis 1. The funnel plot is not symmetrical and there is a

higher concentration of studies on the right side. This indicates the existence of a positive reporting bias, as supposed in Hypothesis 2.

Table 2.1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Z-values of Fisher's Z	498	2.379071	3.101098	-5.20111	21.15714
Promotion gap (1/SE)	498	57.01852	96.40602	8.517103	879.3046
Education	498	0.4538153	0.498363	0	1
Tenure	498	0.3855422	0.4872125	0	1
Individual performance	498	0.311245	0.4634683	0	1
Mentoring	498	0.0502008	0.2185786	0	1
Ethnicity	498	0.3353414	0.4725844	0	1
Children	498	0.3574297	0.4797247	0	1
Temporary leave	498	0.0702811	0.2558772	0	1
Y1970-1979	498	0.1626506	0.3694177	0	1
Y1980-1989	498	0.5502008	0.4979737	0	1
Y1990-1999	498	0.3835341	0.4867355	0	1
Y2000-2009	498	0.3855422	0.4872125	0	1
Y2010-2015	498	0.0983936	0.2981456	0	1
Genderfocus	498	0.6626506	0.4732806	0	1
Author female	498	0.2550201	0.4363108	0	1
Age	498	0.6586345	0.4746446	0	1
Business Study	498	0.5281124	0.499711	0	1
Federal Study	498	0.1144578	0.3186866	0	1
Upper hierarchy	498	0.0823293	0.2751422	0	1
North America	498	0.5461847	0.498363	0	1
Job complexity	498	0.6024096	0.489892	0	1
Impact factor	498	2.208339	1.862511	0	6.448
Self-report	498	0.6385542	0.4809024	0	1
OLS	498	0.0783133	0.268934	0	1
Logit/Probit	498	0.6827309	0.4658811	0	1
Speed of promotion	498	0.0823293	0.2751422	0	1
No. of promotions	498	0.1104418	0.3137548	0	1
Reached upper position	498	0.5200803	0.500099	0	1
Hierarchy level	498	0.0883534	0.2840936	0	1
Career success index	498	0.0823293	0.2751422	0	1

Figure 2.1: Funnel plot of the meta-sample.

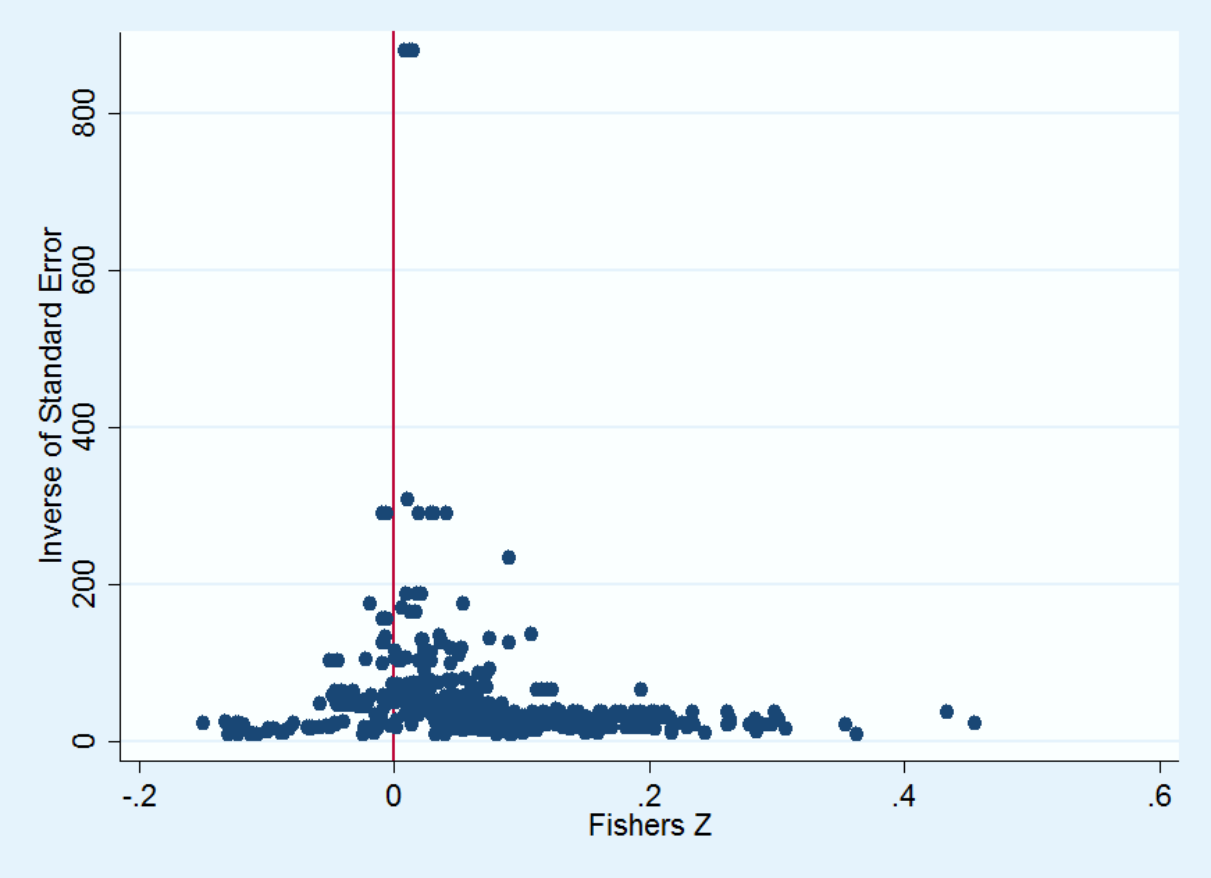

Figure 2.1 shows the study's effect size measured by Fisher's Z on the x-axis and the accuracy by Fisher's associated standard error on the y-axis. The red line indicates the zero line, not the mean.

2.4.2 Simple regression results

Gender promotion gap

In order to test statistically for Hypothesis 1, that is, whether there is a genuine empirical effect, I start with a simple model without control variables (equation 1), shown in Table 2.2. The dependent variable is the z-value of *Fisher's Z* of each estimate. In the first model in column 1 of Table 2.2 – the random-effect model – the coefficient is highly significant (b=0.010; t=8.62; p<0.001) and has a positive sign, indicating that there is an underlying empirical effect that discriminates against women. The results of the fixed-effect model in column 2 (b=0.011; t=25.23; p<0.001) and the clustered model in column 3 (b=0.010; t=7.26; p<0.001) are perfectly in line with the first result, giving evidence for Hypothesis 1. The effect size is rather small, which is already indicated by the small values of *Fisher's Z* in Figure 2.1.

Reporting bias

To test Hypothesis 2, I run an *Egger test*, which is a *funnel-asymmetry test* (FAT) without control variables (Egger, Smith, Scheider, & Minder, 1997). The results of the *Egger test* are shown in Table 2.2 in column 1 for the random-effect model, in column 2 for the fixed-effect model and in column 3 for the clustered (study-effect) model. The constant in all three models is positive and significantly different from zero on a p<0.001 level (random-effect model: b=1.887; t=10.67, fixed-effect model: b=1.401; t=4.42 and clustered model: b=1.782; t=5.92). These results indicate a robust evidence of a reporting bias and the positive values indicate that the gender promotion gap is exaggerated, supporting Hypothesis 2.

Table 2.2: FAT & PET models without controls

Dependent variable: z-values of Fisher's Z (no controls)	**Random-effect model** b (SE)	**Fixed-effect model** b (SE)	**Clustered model** b (SE)
1/SE (Promotion gap) [H1]	0.010*** (0.001)	0.011*** (0.000)	0.010*** (0.001)
Constant (Reporting Bias) [H2]	1.887*** (0.177)	1.401*** (0.317)	1.782*** (0.301)
R-sqr-adj	0.13	0.56	0.10
F-value	74.31***	636.59***	52.72***
N	498	498	498
N-cluster			107

Table 2.2: Unstandardized regression coefficients are presented; numbers in parentheses are standard errors. Significance levels are: † p<0.10, * p<0.05, ** p<0.01, *** p<0.001

2.4.3 Multivariate regression results

Table 2.3 shows the results of a multivariate analysis, which is a FAT and PET model including control variables (equation 2). Similar to Table 2.2, the results for the random-effect model are in column 1, for the fixed-effect model in column 2 and for the clustered model (study-effects) in column 3. First, I will verify that in the multivariate model, Hypotheses 1 and 2 are supported.

In the multivariate model, a joint test is necessary to test for the gender promotion gap. The result of the inverse of the standard error alone is not sufficient to draw conclusions regarding the significance of the gap. Such a joint test assumes that the inverse of the standard error and all Z-variables are together significantly different from zero. In Table 2.3, all Z-variable coefficients are marked by a slight grey background color. The results of the joint test are calculated by using an F-test, which is not part of Table 2.3, but the results are presented in the following. For the random-effect model the F-test reports F (30, 438) = 10.99; p<0.001.

The same can be calculated for the fixed-effect model, which is F (30, 438) = 4.30; p<0.001. The test for the clustered model (study-level effects) reports F (28, 124) = 24.37; p<0.001. All models report an effect in the same direction and confirm Hypothesis 1 again. There is a genuine gender promotion gap, even after controlling for the publication bias and the other predictors.

For the evidence of reporting bias in the model with controls a joint test, similar to the gender promotion gap, is necessary as well. Again, an F-test is performed testing whether the constant and the K-variables together are significantly different from zero. This test reports significant evidence of a reporting bias in two of the three models. The result for the random-effect model is F (30, 438) = 4.44; p<0.001, and the result for the clustered model is F (30, 106) = 6.56; p<0.001. This indicates that studies exaggerate the female disadvantage and give support to Hypothesis 2. However, the fixed-effect model does not support the existence of a publication bias when all controls are included, because the F-test reports: F (30, 438) = 0.84; p>0.1. Recall that this model is based on the assumption that there is one true effect for all studies and that five estimates have the major weight. In my sample the assumption of the true effect seems to be unlikely, because I use different measurements for objective career success and because I include studies from different organizational contexts. Therefore it seems likely that a bias exists.

Table 2.3: FAT & PET models with controls

Dependent variable: z-values of Fisher's Z	**Random-effect model** b (SE)	**Fixed-effect model** b (SE)	**Clustered model** b (SE)
1/SE	0.209***	0.215	0.192***
	(0.062)	(0.269)	(0.047)
Constant	-0.316	-1.264	-0.183
	(2.333)	(10.268)	(1.738)
gender career gap influencers (Z-Variables)			
Contest mobility perspective [H3]			
Education	-0.047***	-0.063**	-0.043**
	(0.010)	(0.024)	(0.014)
Tenure	0.021*	0.024	0.014
	(0.011)	(0.022)	(0.012)
Individual performance	0.048***	0.068*	0.041**
	(0.012)	(0.033)	(0.014)
Sponsored mobility perspective [H4]			
Mentoring	-0.125**	-0.185	-0.074†
	(0.046)	(0.176)	(0.043)
Ethnicity	-0.043**	-0.083†	-0.022
	(0.016)	(0.045)	(0.017)
Children	-0.008	0.011	-0.013
	(0.010)	(0.024)	(0.011)
Temporary leave	-0.002	-0.007	0.006
	(0.027)	(0.095)	(0.020)
Time effects [H5]			
Y1970-1979	-0.014	-0.033†	-0.005
	(0.009)	(0.017)	(0.015)
Y1980-1989	-0.004	-0.027	-0.002
	(0.010)	(0.021)	(0.009)
Y1990-1999	-0.011	0.022	-0.015
	(0.010)	(0.021)	(0.010)
Y2000-2009	-0.045***	-0.068*	-0.036**
	(0.012)	(0.033)	(0.013)
Y2010-2015	-0.041†	-0.059	-0.036†
	(0.021)	(0.062)	(0.019)
Gender background [H6]			
Gender focus	0.050***	0.035	0.040**
	(0.014)	(0.041)	(0.013)
Author female	0.051**	0.087†	0.014
	(0.017)	(0.048)	(0.023)
Further variables			
Age	-0.022	-0.027	-0.026†
	(0.014)	(0.038)	(0.015)
Business Study	-0.011	-0.030	-0.011
	(0.024)	(0.077)	(0.023)
Federal Study	0.017	0.020	-0.007
	(0.025)	(0.079)	(0.031)
Upper hierarchy	-0.008	0.004	-0.007
	(0.018)	(0.053)	(0.020)
NorthAmerica	-0.047**	-0.047	-0.035†
	(0.017)	(0.049)	(0.021)
Job complexity	-0.030	-0.065	-0.023
	(0.022)	(0.077)	(0.016)
Impact factor	-0.005	-0.005	-0.006
	(0.004)	(0.011)	(0.004)
Self-report	0.023	0.045	0.009
	(0.014)	(0.042)	(0.018)

Dependent variable: **z-values of Fisher's Z** (continuation second page)	**Random-effect model** b (SE)	**Fixed-effect model** b (SE)	**Clustered model** b (SE)
OLS	-0.033	-0.068	-0.023
	(0.029)	(0.089)	(0.027)
Logit/Probit	-0.025†	-0.029	-0.009
	(0.014)	(0.038)	(0.013)
Career success measures			
Speed of promotion	-0.071	-0.014	-0.070
	(0.061)	(0.260)	(0.045)
No. of promotions	-0.080	-0.013	-0.069
	(0.063)	(0.265)	(0.046)
Reached upper position	-0.110†	-0.070	-0.098*
	(0.058)	(0.259)	(0.041)
Hierarchy level	-0.097	-0.054	-0.059
	(0.071)	(0.286)	(0.054)
Career success index	0.037	0.122	0.015
	(0.091)	(0.419)	(0.044)
Reporting bias influencers (K-Variables)			
Contest mobility perspective			
Education	0.856	1.738	0.745
	(0.637)	(2.105)	(0.569)
Tenure	-2.217***	-2.843	-1.612**
	(0.622)	(2.203)	(0.556)
Individual performance	-2.754***	-3.980	-2.426**
	(0.721)	(2.504)	(0.738)
Sponsored mobility perspective			
Mentoring	2.662	3.986	1.436
	(1.663)	(7.732)	(0.955)
Ethnicity	0.876	2.836	0.183
	(0.774)	(2.796)	(0.655)
Children	0.330	-0.863	0.594
	(0.616)	(2.205)	(0.520)
Temporary leave	1.377	2.125	0.676
	(1.347)	(5.679)	(1.000)
Time effects			
Y1970-1979	1.746**	2.815	1.426†
	(0.669)	(2.046)	(0.794)
Y1980-1989	-0.461	1.145	-0.510
	(0.655)	(2.167)	(0.558)
Y1990-1999	0.751	-0.851	0.676
	(0.599)	(2.042)	(0.462)
Y2000-2009	0.106	1.361	-0.020
	(0.672)	(2.361)	(0.543)
Y2010-2015	-0.538	0.494	-0.342
	(1.187)	(4.172)	(0.970)
Gender background			
Gender focus	-1.013	-0.365	-0.310
	(0.686)	(2.553)	(0.575)
Author female	-1.866*	-2.977	-0.281
	(0.828)	(2.930)	(0.899)
Further variables			
Age	0.086	0.360	0.377
	(0.687)	(2.385)	(0.689)
Business Study	0.075	0.839	0.041
	(1.069)	(4.096)	(0.983)
Federal Study	-1.982	-1.636	-0.953
	(1.258)	(4.487)	(1.666)

Dependent variable: **z-values of Fisher's Z** (continuation third page)	**Random-effect model** b (SE)	**Fixed-effect model** b (SE)	**Clustered model** b (SE)
Upper hierarchy	0.389	0.048	0.548
	(0.986)	(3.847)	(0.838)
NorthAmerica	0.023	-0.520	-0.335
	(0.776)	(2.753)	(0.834)
Job complexity	-0.578	1.014	-0.855
	(0.969)	(3.931)	(0.667)
Impact factor	0.144	0.200	0.164
	(0.189)	(0.732)	(0.147)
Self-report	-1.315†	-2.397	-0.688
	(0.721)	(2.527)	(0.694)
OLS	2.156†	3.893	1.459†
	(1.183)	(4.907)	(0.738)
Logit/Probit	0.678	0.688	-0.146
	(0.802)	(2.802)	(0.643)
Career success measures			
Speed of promotion	2.096	0.252	1.888
	(2.136)	(9.299)	(1.580)
No. of promotions	1.532	-0.335	0.946
	(2.226)	(9.714)	(1.504)
Reached upper position	3.898*	2.494	3.427**
	(1.941)	(8.867)	(1.298)
Hierarchy level	4.515†	3.438	2.842†
	(2.315)	(9.967)	(1.651)
Career success index	-0.167	-2.988	0.555
	(3.006)	(14.175)	(1.333)
R-sqr-adj	0.59	0.70	0.55
F-value	13.32***	20.79***	1105.05***
N	498	498	498
N-cluster			107

Table 2.3: Unstandardized regression coefficients are presented; numbers in parentheses are standard errors. Significance levels are: † p<0.10, * p<0.05, ** p<0.01, *** p<0.001

The following section examines the variation among the reported estimates, which are represented by the Z-variables.[5] I begin with reporting the results related to Hypothesis 3, the variables of the contest mobility perspective. The coefficients for *education* are significant and have a negative sign in all three models (at least on a $p<0.01$ level). This indicates that studies that include a variable measuring the education find a smaller gender career gap than studies without such a measure. For *tenure*, the evidence is rather weak; the coefficients are not significant in two of the three models. The model used as a robustness check, the PEESE model (Table 4), even reports no significance for this coefficient at all. The coefficient for *individual performance* has a positive and significant sign, at least on a $p<0.05$ level in all three models. This was not expected and is in contrast to Hypothesis 3. Studies without an individual performance measurement report a smaller gender promotion gap, and studies that include performance, widen the gap. I will discuss this issue in the next section. Summing it up, the human capital variable *education* supports Hypothesis 3.

Hypothesis 4, whether the sponsored mobility variables report a smaller gender promotion gap, receives some support. For *mentoring*, the random-effect model reports a significant coefficient on a $p<0.01$ level, and the clustered model reports a coefficient on a $p<0.10$ level. However, the fixed-effect model finds no significant effect. The results regarding *ethnicity* are similar to the ones for *mentoring*. Two models report a significant negative effect, the random-effect model on a $p<0.01$ level and the fixed-effect model on a $p<0.10$ level. The third model (clustered model) reports no effect. Therefore, at least some evidence exists that including *ethnicity* in studies shrinks the gender promotion gap. In the PEESE model (Table 4), at least the significance of the fixed-effect model increases to $p<0.05$, giving some more support for Hypothesis 4. The coefficients for *children* and *temporary leave* are not significant. Therefore, women having children or taking a temporary leave do not experience any special discrimination.

The fifth hypothesis, regarding *time effects*, proposes that newer studies report smaller gender promotion gaps. Indeed, studies that are using data from the time period *2000-2009* find smaller gender career differences, compared to very early studies (1946-1969). This result is confirmed by all models at least on a $p<0.05$ level. Support is found as well for the newest data group (*2010-2015*), but only at the $p<0.10$ level in the fixed and the clustered models.

[5] I do not further investigate the results of the K-variables. The K-variables report which study characteristics increase or decrease the propensity to report a gender promotion gap, which is only relevant for the joint test for Hypothesis 2. Instead I concentrate on examining which elements influence the magnitude of the gender promotion gap reported by the Z-variables.

The results of the PEESE models for the years *2010-2015* are clearer: Here the random-effect model reports coefficients on a $p<0.001$ level, the fixed-effect model on a $p<0.1$ level and the clustered model on a $p<0.05$ level. I will investigate this result further in the discussion.

The two last hypotheses are about the influence of gender as a study characteristic. For studies that have a *gender focus* in the theoretical part (Hypothesis 6a), the random and the clustered model report a significant and positive coefficient at least on a $p<0.01$ level. This suggests that studies with a focus on gender issues find larger gender differences. The results regarding the gender composition of the authors (Hypothesis 6b) show that articles with solely women authors tend to report a larger gender promotion gap, albeit the evidence is weak: The random-effect model reports a positive significant coefficient on a $p<0.05$ level, the fixed effect model on a $p<0.10$ level and for the clustered model it is $p>0.10$.

2.4.4 Robustness-check: the PEESE-model

The results of the PEESE model are shown in Table 4, serving as a robustness-check for the FAT-PET approach. All results reported by the PEESE model are similar to the results of FAT-PET model. In the previous section, I already made references to where the PEESE approach was helpful. For this reason I do not further investigate the results of the PEESE approach.

Table 2.4: PEESE without and with controls

Dependent variable: z-values of Fisher's Z	Random-effect model 1 (PEESE) b (SE)	Fixed-effect model 1 (PEESE) b (SE)	Clustered model 1 (PEESE) b (SE)	Random-effect model 2 (PEESE) b (SE)	Fixed-effect model 2 (PEESE) b (SE)	Clustered model 2 (PEESE) b (SE)
Promotion gap (1/SE)	0.015***	0.013***	0.016***	0.173***	0.186	0.159***
	(0.001)	(0.000)	(0.003)	(0.031)	(0.120)	(0.027)
Reporting Bias (SE)	49.718***	70.502***	28.011***	34.266	80.721	13.393
	(5.391)	(17.832)	(7.166)	(39.152)	(168.816)	(24.810)
gender career gap influencers (Z-Variables)						
Education				-0.036***	-0.046***	-0.031**
				(0.006)	(0.013)	(0.009)
Tenure				-0.004	0.005	-0.011
				(0.007)	(0.012)	(0.011)
Individual performance				0.023**	0.040*	0.013†
				(0.007)	(0.017)	(0.007)
Mentoring				-0.071**	-0.137	-0.027
				(0.027)	(0.084)	(0.036)
Ethnicity				-0.023*	-0.057*	-0.010
				(0.009)	(0.022)	(0.010)
Children				-0.009	-0.001	-0.012†
				(0.006)	(0.012)	(0.007)
Temporary leave				0.011	0.017	0.012
				(0.014)	(0.042)	(0.011)
Y1970-1979				0.003	-0.013	0.010
				(0.006)	(0.009)	(0.011)
Y1980-1989				-0.007	-0.010	-0.008
				(0.007)	(0.012)	(0.009)
Y1990-1999				-0.018**	0.003	-0.021*
				(0.006)	(0.012)	(0.008)
Y2000-2009				-0.036***	-0.052**	-0.030**
				(0.007)	(0.018)	(0.010)
Y2010-2015				-0.040***	-0.049†	-0.038*
				(0.011)	(0.030)	(0.015)
Gender focus				0.041***	0.037†	0.037***
				(0.008)	(0.021)	(0.008)
Author female				0.022*	0.054*	0.006
				(0.009)	(0.025)	(0.012)
Age				-0.024**	-0.028	-0.022*
				(0.008)	(0.020)	(0.010)
Business Study				-0.013	-0.023	-0.017
				(0.013)	(0.038)	(0.013)
Federal Study				-0.005	0.003	-0.019
				(0.014)	(0.040)	(0.016)
Upper hierarchy				-0.007	0.004	-0.011
				(0.010)	(0.027)	(0.017)
NorthAmerica				-0.038***	-0.044	-0.031*
				(0.010)	(0.027)	(0.013)
Job complexity				-0.024*	-0.045	-0.021*
				(0.011)	(0.036)	(0.010)
Impact factor				-0.002	-0.003	-0.001
				(0.002)	(0.006)	(0.003)
Self-report				0.009	0.024	0.002
				(0.008)	(0.022)	(0.012)
OLS				-0.002	-0.044	0.012
				(0.018)	(0.047)	(0.023)
Logit/Probit				-0.005	-0.016	0.006
				(0.008)	(0.020)	(0.008)

Dependent variable: z-values of Fisher's Z (continuation second page)	**Random-effect model 1 (PEESE)** b (SE)	**Fixed-effect model 1 (PEESE)** b (SE)	**Clustered model 1 (PEESE)** b (SE)	**Random-effect model 2 (PEESE)** b (SE)	**Fixed-effect model 2 (PEESE)** b (SE)	**Clustered model 2 (PEESE)** b (SE)
Speed of promotion				-0.037	-0.010	-0.033
				(0.030)	(0.118)	(0.024)
No. of promotions				-0.052†	-0.009	-0.047†
				(0.031)	(0.120)	(0.025)
Reached upper position				-0.067*	-0.052	-0.057**
				(0.028)	(0.115)	(0.021)
Hierarchy level				-0.032	-0.028	-0.005
				(0.039)	(0.139)	(0.037)
Career success index				0.024	0.052	0.016
				(0.040)	(0.178)	(0.023)
Reporting bias (K-Variables)						
Education				12.197	9.442	10.742
				(14.625)	(56.269)	(10.735)
Tenure				-34.623*	-62.253	-16.093†
				(13.610)	(53.994)	(8.702)
Individual performance				-55.483***	-96.639	-35.175**
				(15.252)	(61.795)	(11.116)
Mentoring				22.872	45.606	9.215
				(22.270)	(103.456)	(11.517)
Ethnicity				-5.894	26.813	-12.853
				(14.947)	(59.891)	(11.478)
Children				19.345	19.098	17.552†
				(14.009)	(55.429)	(10.316)
Temporary leave				19.006	31.709	5.460
				(23.799)	(103.317)	(15.574)
Y1970-1979				34.442*	63.630	25.348
				(17.229)	(63.105)	(18.419)
Y1980-1989				-13.086	-4.770	-8.160
				(14.080)	(57.326)	(11.262)
Y1990-1999				29.623*	29.438	17.459*
				(13.232)	(53.481)	(8.750)
Y2000-2009				-9.115	3.284	-7.502
				(14.337)	(58.459)	(8.973)
Y2010-2015				-14.723	-22.813	-4.599
				(25.317)	(98.378)	(17.689)
Gender focus				-15.437	-25.166	-2.643
				(13.435)	(55.693)	(10.214)
Author female				-16.832	-58.261	9.000
				(16.345)	(66.245)	(12.180)
Age				9.232	6.103	12.325
				(13.958)	(54.786)	(12.252)
Business Study				1.414	7.012	6.637
				(19.472)	(80.446)	(16.080)
Federal Study				-32.071	-38.089	-12.054
				(25.165)	(101.380)	(28.865)
Upper hierarchy				13.141	2.855	18.078
				(19.709)	(84.839)	(14.394)
NorthAmerica				-1.130	-4.001	-6.802
				(15.785)	(61.581)	(13.351)
Job complexity				-27.464†	-12.452	-26.659*
				(16.385)	(70.877)	(11.292)
Impact factor				-0.468	2.280	-1.114
				(3.742)	(15.615)	(2.404)
Self-report				-28.608†	-64.894	-12.626
				(14.675)	(57.836)	(10.657)

Dependent variable: z-values of Fisher's Z (continuation third page)	**Random-effect model 1 (PEESE)** b (SE)	**Fixed-effect model 1 (PEESE)** b (SE)	**Clustered model 1 (PEESE)** b (SE)	**Random-effect model 2 (PEESE)** b (SE)	**Fixed-effect model 2 (PEESE)** b (SE)	**Clustered model 2 (PEESE)** b (SE)
OLS				26.567	64.393	14.112
				(19.055)	(86.648)	(10.066)
Logit/Probit				-7.612	-12.221	-12.208
				(16.815)	(69.791)	(9.603)
Speed of promotion				19.814	-22.972	22.210
				(34.162)	(147.135)	(23.593)
No. of promotions				17.060	-28.397	14.919
				(34.013)	(147.798)	(20.918)
Reached upper position				73.314*	57.048	59.928**
				(28.383)	(126.025)	(21.041)
Hierarchy level				57.493†	55.422	28.141
				(34.832)	(148.978)	(21.607)
Career success index				8.871	-22.726	17.928
				(40.834)	(191.875)	(19.562)
R-sqr-adj	0.43	0.87	0.36	0.72	0.91	0.70
F-value	185.91***	1722.38***	31.46***	22.63***	88.04***	185.09***
N	498	498	498	498	498	498
N-cluster			107			107

Table 2.4: Unstandardized regression coefficients are presented; numbers in parentheses are standard errors. Significance levels are: † p<0.10, * p<0.05, ** p<0.01, *** p<0.001

2.5 Discussion and Conclusions

This study is based on the question regarding the existence of a gender promotion gap. The comparison of almost 500 reported results of more than 100 studies from academic, business and federal organizations reveals that women have a genuine promotion disadvantage compared to men. The included outcome measures suggest that women receive fewer promotions, advance more slowly, are less likely promoted to the upper levels of an organization and rank lower in the ranks of the upper hierarchy. The existence of a gender promotion gap is robust, even after controlling for unpublished publications. This reporting bias is the second major result of this study; it indicates that studies might not be published when their results reject general wisdom, or are counter to the prevailing view (Dalton et al., 2012; Orlitzky, 2011; Stanley & Doucouliagos, 2012).

Regarding the size of the gender promotion gap, it is difficult to come to an unambiguous conclusion. There is a lot of heterogeneity in the career research due to the use of different methods to measure the career outcome. Even within a category of dependent variables – for example *speed of promotion* – researchers use different outcome measures. In my regression results, the coefficients that measure the magnitude of the gap are about 0.2. This is on the one hand not a large effect size, but on the other hand not small enough to be negligible. It is necessary to set this coefficient in the right context to understand the impact: In the sample,

studies have on average a time horizon of 7.4 years. Compared to a whole career, this is a rather short time. The overall consequences are that the results of a study only give a partial insight into a much longer time period – the whole career. When a study reports that women are promoted with a delay of six months compared to men, the disadvantage for women do not sound not too bad. But after 37 years, women would have a delay of 2.5 years (based on the assumption that the study has an average time horizon of 7.4 years). The conclusion that can be drawn regarding the effect size is that although the size of this gap is exaggerated and the true gap between men and women is smaller as commonly expected – due to the reporting bias – the size of the gap has still a relevant magnitude.

For studies that examine the gender promotion gap, it is essential to include control variables. I used the contest mobility and the sponsored mobility perspective to group common career variables. The hypotheses suggest that studies that include variables of these perspectives report smaller promotion gaps: One of the most relevant control variables are measures for *education*, which belong to the contest mobility perspective. Studies without *education* as control, report an unnecessarily large gender promotion gap. This is somehow surprising, because today women have the same level of education as men in most countries (Altonji & Blank, 1999; GrantThornton, 2013). The reason why education is still important for explaining the promotion gap is because the study's samples go back for more than 40 years, including times when the level of education was not equal between men and women (Altonji & Blank, 1999).

The results of the coefficients for *individual performance* are in contrast to my expectations. The results show that studies that include measures for *individual performance* of employees report a larger gender gap than studies that do not control for performance measure. One possible reason why studies that include performance widen the gap is that such a measure is only collectable in specific work contexts. Data for *individual performance* must be available to the researcher in order to include this measure. That such a measure is available is more likely the case for organizations with incentive systems. The research of Castilla (2008) and Castilla and Benard (2010) shows that incentive systems have an effect on individual evaluations. With the help of three experimental studies, Castilla and Benard (2010) show that individuals in an organization driven by incentives will evaluate the performance of others in a more biased way as compared to individuals who act in less incentive-driven organizations. Other empiric evidence shows that a wage gap exists or is even aggravated in incentive pay systems, although the idea of such systems is to eliminate gender differences (Booth & Frank,

1999; Chauvin & Ash, 1994; De la Rica, Dolado, & Vegas, 2010; Green, Heywood, & Theodoropoulos, 2014). My results suggest that the same could be true for the gender promotion gap. Studies that are able to include an individual performance control are based more likely in incentive-driven organizations, which aggravate the promotion gap by giving women biased or wrong evaluations.

There is also evidence that *mentoring* and *ethnicity*, both part of the sponsored mobility perspective, are important to report unbiased results. For both variables, there are significant effects. This indicates that studies that include variables for *mentoring*, report a smaller promotion gap, because females and males receive career support to a different magnitude, and women might be less likely chosen to receive mentoring due to homophily (Ibarra, 1992; Lyness & Thompson, 2000; McPherson et al., 2001). The same is true for *ethnicity*: studies that include ethnicity report a smaller gender gap than studies without such a control. This suggests that promotion effects are different for employees with different ethnical background.

Regarding time effects, the results show that newer studies find smaller gender career gaps. Especially studies using data from the time period *2000-2009* report smaller gender promotion gaps, compared to very early studies (1946-1969). This result is confirmed by all models at least on a $p<0.05$ level. For the newest data time period (*2010-2015*), the reported significance is somewhat lower. One reason might be that gender equality has not increased recently. Dobbin and Kalev's (2016) data give some evidence for this claim. They report that among all U.S. companies with at least 100 employees, the proportion of women in management has not increased in recent years. A second reason for the lower significance level for the newest time period might be the few observations existing for this group. Only about 10% of all estimates fall in this time period. The comparison of the coefficients of the years *2000-2009* with coefficients of the years *2010-2015* shows that the magnitude is very similar, meaning that the missing significances, especially in the FAT and PET model compared to the PEESE model, is not necessarily an indication that the gap widens again.

There is some evidence for the *Pygmalion effect* (Rosenthal, 1966), that describes that the expectation of researchers influence the research outcome. Studies that use a theory with a focus on gender are more likely to find a gender career gap. By using a specific theory, researchers are either eager to confirm the theory or the theory has an influence on the model specification, which exaggerates the results.

Limitations

Like all studies, this work has certain limitations. First, beyond the tested approaches regarding female career disadvantages, there are further explanations, which have not been hypothesized or coded. For example, there is evidence that gender differences in the social network configuration influence career outcomes as well (Burt, 1998; Forret & Dougherty, 2004). The social network is not included here, not because it is not relevant or important, but because there are too few studies offering enough information to include such a control and to draw a conclusion regarding its effect on the gender career gap. Second, there are alternative approaches to test for publication bias, for example, *Rosenthal's failsafe N, trim and fill, hedges' maximum likelihood*, etc. (Stanley & Doucouliagos, 2012). I did not use these approaches because of space considerations and because of the advantages the FAT-PET approach offers. Third, to test for a publication bias, statistical methods have been used instead of a direct test that compares unpublished with published data. Future research could compare unpublished with published data to examine whether the bias remains. Although I tried to collect as many unpublished studies as possible, there still might be more and I cannot guarantee to have found all suitable studies.

2.6 References

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2.7 Appendix

2.7.1 Control variables in the regression

In the meta-regression models, I included many control variables. For space considerations I did not report them in the *measures of key constructs* section, but I briefly explain, all control variables in the following.

A common control variable in career studies is *age* and therefore included in this meta-regression. The variable is coded with one if the regression model of a study controls for the age of employees. Studies of this meta-regression can be divided into three different work contexts, i.e., careers in academia, in business organizations and in federal organizations. The variable *business study* and *federal study* controls for the respective context. Studies in academic organizations serve as reference category. The variable *upper hierarchy* tests whether the sample of the respective study is only a sample drawn from positions with decision-making competences, such as the management. If the sample is mixed or if only lower-level employees are in the sample, then the variable is coded as zero. For samples from organizations located in Canada and USA, the variable *North America* controls for. The variable *job complexity* is coded with one for all studies that include only complex jobs, for which higher educational training and specific skills are necessary, such as for an academic researcher or a manager. The *impact factor* of a journal can be used as a measure of the quality (Stanley & Doucouliagos, 2012). If the impact factor was not available (e.g., working papers, conference proceedings, dissertations) zero is assigned. The variable *self-report* is coded with one if the employees report their career progress themselves and is coded with zero if data come from organizations directly. If an ordinary least squares method is used in the study's regression model, the variable *OLS* is coded as one and zero otherwise. If a logit or probit method is used, the variable *Logit/ Probit* is coded in the same way.

I also control for various career success measures, i.e., different dependent variables studies are used. I build six categories of career success measures: The outcome variable *speed of promotion* enfolds all models that measure how fast an employee advances. One example could be how long it takes for individuals to obtain a promotion to a managerial position (Coelho, Fernandes, & Foguel, 2014). Dependent variables that measure the number of promotions in a specific timeframe are covered by the variable *no. of promotions*. For example, this variable relates to the number of promotions an individual has received since s/he has completed the MBA degree (Dreher & Ryan, 2002). The variable *reached upper*

position refers to studies that use a dummy to measure whether or not an individual has been promoted to a specific rank, for example to the manager rank (Bergeron et al., 2013). *Hierarchy level* refers to studies that measure the management or hierarchical level. For example, Baruch, Grimland and Vigoda-Gadot (2014) measure the position in the organizational hierarchy according to the management level on a scale from 1 up to 9. The *career success index* controls for dependent variables that contain various single career success measures that have been put together into an index variable. For example, this can be a combination of the permission to delegate, project responsibility and an official leadership position (Abele & Spurk, 2009b). The reference category consists of dependent variables that are related to career success but cannot be sorted to one of the five presented categories. About 9% of the observations fall in the last category.

3 The influence of gender ratios on academic careers: Marrying network analysis with token theory

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Abstract

This paper examines how gender proportions at the workplace affect the extent to which individual professional networks support the career progress. Previous studies have argued that men and women respectively benefit from different network structures. However, the empirical evidence about these differences has been contradictory or inconclusive at best. Combining the network theory of structural holes with token theory, we argue that gender-related differences in the way that networks affect career advancement exist only in situations where women are in a token position; that is, when they are severely underrepresented. To test our hypotheses, we use a sample of professors at a Swiss university. Our empirical results confirm that when gender ratios are more balanced, gender-related differences in the effect that these networks have on promotion disappear. This finding helps us explain the inconsistencies in the conclusions of earlier studies.

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3.1 Introduction

Many researchers who study networks have taken an interest in gender-related differences in the structure of individual professional networks and how these networks affect the success at the workplace (Burt, 1998). Some have argued that, compared to their male colleagues, women are more often excluded from professional networks (Bevelander & Page, 2011; Brass, 1985), that they have fewer professional network contacts (Aldrich, 1989; Cromie & Birley, 1992), that they need different professional networks for career success (Aldrich, 1989; Bevelander & Page, 2011; Bierema, 2005; Broadbridge, 2010; Burt, 1992; Moore, 1990; Munch, McPherson, & Smith-Lovin, 1997), and that they use professional networks less effectively (Bierema, 2005; Broadbridge, 2010; Timberlake, 2005). However, the empirical evidence about these differences is contradictory or inconclusive at best. A range of empirical studies that have explored different settings have found no gender-related differences in the configuration and effects of professional networks regarding various outcomes. For example, in their study of bonus payments Gargiulo, Ertug and Galunic (2009) show that both women and men benefit from the same network structures. Similarly, in their study of success in the re-employment of white-collar job seekers, Lambert, Eby and Reeves (2006) find no significant differences in the effects of the networks of men and women. In a related study, Sabatier (2010) examines what determines the length of time it takes for men and women to get promoted in France. She reports that the effects of networks were not different for either gender.

In this study we seek to address this apparent contradiction in the literature. Focusing on how the configuration of individual professional networks influences the chances of successful promotion among men and women respectively, we try to explain why women sometimes benefit from different and sometimes from the same network configuration as their male colleagues. More specifically, we draw on social network theory and token theory (Burt, 1992; Kanter, 1977a) to argue that gender-related differences in the effects of professional networks on career success are a result of differences in the proportion of women in the respective work context. To develop our argument, we distinguish between two different *ego network* configurations in the professional context. An ego network is a kind of social network that focuses on an individual and her/his contacts (Oh, Choi, & Kim, 2005). The first type is a network that contains many *structural holes* (Burt, 1992). Broadly put, this concept describes gaps in a social structure that would be created if the person who occupies such a structural hole would not exist. Individuals who are occupying many structural holes have

more opportunities to act as so-called *brokers*, giving them access to exclusive information and resources. The second type describes individuals that occupy few structural holes, where one's access to exclusive information and resources relies on the support from sponsors occupying more structural holes (Burt, 1992).

To date, hardly any studies have examined whether the number of women within an organization or work unit moderates the influence professional networks have on career outcomes. In fact, earlier works tend to report the proportions of men and women in the entire organization (e.g., Burt, 2004) or in the study's sample (e.g., Ginther & Hayes, 2003). As we argue, this approach is mistaken, because the proportion of women in a specific context changes the circumstances that influence career advancement (Matsa & Miller, 2011; Williams & O'Reilly, 1998). For that reason, in our study we relate specific network configurations to the distribution of men and women in a particular work context. We predict that gender-related differences how network configurations affect promotion success, exist only in contexts where women are extremely under-represented; i.e., where they have what is known as token status (Kanter, 1977b). When the share of women is sufficiently high, we expect that such differences disappear. As we will argue, the explanation for this pattern lies in the legitimacy deficit associated with token positions (Burt, 1998; Kanter, 1977a) which restrict an individual's potential to benefit from structural holes.

On the basis of this argument we develop four hypotheses on how gender proportions, network structures and the speed of internal promotion interrelate. To test our hypotheses, we rely on a unique dataset of professors employed at a large university in Switzerland. The context of a large university with different faculties[4] seems particularly suitable for our purpose. First, different faculties have distinctly defined boundaries and the career paths within each faculty are clearly discernible. Researchers tend to advance their careers in a particular faculty and, as long as they work at the same university, they remain within the same faculty (cf. Haeck & Verboven, 2012). This pattern allows us to focus on one organization, i.e., one university, and to compare the relatively independent sub-organizations, i.e., faculties, it comprises. Second, the goal that most researchers pursue in the academic system is to reach full professorship (Enders, 2007). For that reason, academic careers lend themselves to comparative studies. Third, information on the research activity of

[4] The university in our sample consists of seven faculties. Faculties (e.g., the Faculty of Medicine) are units that encompass different research disciplines (such as the Department of Physiology and the Department of Neuroscience) and are responsible for research, teaching, and public services in their respective fields.

professors is for the most part publicly available and can serve as a reliable measure of their relative performance.

The results we obtain from analyzing our data support the hypotheses. Specifically, we find that women in token positions are promoted faster when they rely on professional networks with few structural holes, while women in non-token positions are promoted faster by occupying more structural holes. These findings also confirm that gender-related network differences are only important in token situations.

The contributions of our paper are threefold. First, our paper contributes to the literature on gender differences in professional networks and can be seen as a response to calls for more research on the claim (Burt, 1998) that women benefit more from networks containing few holes (Broadbridge, 2010). Taking up this call, we examine gender proportions as a potentially key context variable (Hoobler, Wayne, & Lemmon, 2009) and highlight the effects of gender ratios on professional networks. Second, we contribute to the debate on the sources of gender-related differences in network preferences by offering evidence for the argument that such differences are not inherently related to gender, as some suggest (Bierema, 2005; Gersick, Dutton, & Bartunek, 2000; Timberlake, 2005), but are shaped by the context or situation in which they arise (Brass, 1985; Gersick et al., 2000; Ibarra, 1997; Moore, 1990). Third, we contribute to the literature on the role of networks in academic contexts by showing that the effects of networks on the speed of promotion is an important, and so far under-researched, aspect of academic success (Park, 2007).

3.2 The prospects of career advancement for women in advanced positions

3.2.1 The configuration and impact of professional networks

There is a large body of literature on how differences in the structure of professional networks affect career advancement. Professional networks play a key role in career success in that they grant access to information and resources, which is particularly important in higher-level jobs (Adler & Kwon, 2002; Burt, 1992; Seibert, Kraimer, & Liden, 2001). One reason for this argument is that the people who determine who gets promoted tend to favor candidates to whom they have personal relations, which reduce the risk of adverse promotions (Beckert, 2009; Granovetter, 1985). A second reason is that advantageous network relationships may help potential candidates gain a better understanding of the relevant evaluation criteria and prepare for their promotion accordingly (Beckert, 2009). A third reason is that having a strong position within a professional network can help foster innovation and creativity and thus

increase one's prospects of promotion (Burt, 2004). In the academic context in particular, network relationships can affect both the performance and reputation of researchers (Jungbauer-Gans & Gross, 2013; Lissoni, 2010; Oh et al., 2005).

Apart from personal relationships as such, the structural features that characterize a personal professional network (*ego network*) have also been shown to affect the career chances of that individual. In our network approach we concentrate on the individual perspective and the set of contacts an individual has connections to and call such an individual *ego*. Actors who have many opportunities to act as *brokers*, in the sense that they bridge otherwise unconnected people, receive more *non-redundant* – that is, unique – information and thus tend to be better informed about imminent openings or impending disasters (Podolny & Baron, 1997; Zaheer & Soda, 2009). Moreover, they are well placed to discern how the needs of one group could be served by skills that another group possesses and have more chances than other actors to bring together diverse individuals.

The idea that brokers have certain advantages within their network can be explained by the notion of *structural holes*. A structural hole is "*a relationship of non-redundancy between two contacts*" (Burt, 1992, p. 18). This means that an individual who occupies the space of a structural hole has the chance to function as an intermediary who facilitates the exchange of information and resources between people who are otherwise unconnected (Burt, 1992). Figure 3.1 illustrates the position of a structural hole. Without ego, the group on the left would be disconnected with the group on the right. As broker, ego is the bridge between both groups. Among closely connected peers the information that circulates is redundant, whereas the information that the members of a different group possess or have access to is non-redundant, i.e., unique, from the viewpoint of the first group. What brokers do is that they connect people who belong to different groups and have access to non-redundant information that the members of other groups are not aware of (Borgatti & Halgin, 2011; Tasselli, 2015). As a result, brokers are in an advantageous position because they have access to and control over information as well as resources. Individuals who occupy many structural holes tend to be particularly prominent in their organization and have high chances of promotion (Burt, 1992).

Figure 3.1: Social network with structural hole

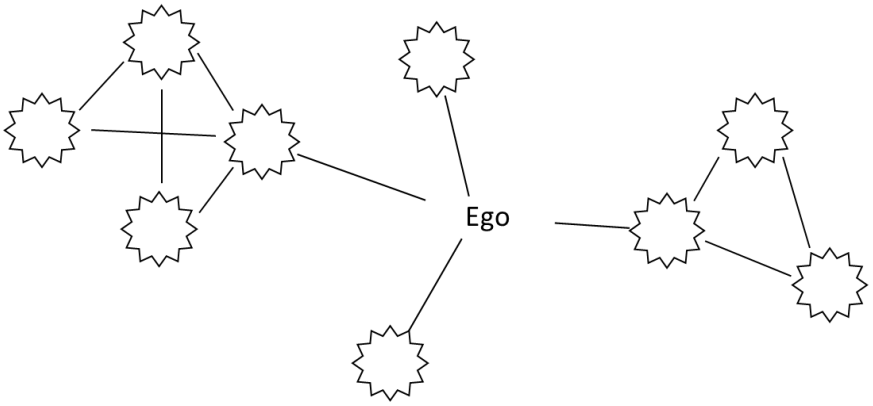

Figure 3.1 illustrates one structural hole in an individual's network. Ego occupies a structural hole and thus acts as a broker between two groups. Without ego, the group on the left would be disconnected from the group on the right.

The opportunities for brokerage increase with the number of structural holes an individual occupy (Burt, 2007). In contrast, personal networks that contain only few structural holes, i.e., where one has many connections to direct peers but only few connections to other or distant groups, the opportunities for brokerage are severely limited. Accordingly, a way to gain access to exclusive information and resources is to have strategic partners, so-called *sponsors* with more structural holes in their professional network (Burt, 1998; Ridgeway & Smith-Lovin, 1999). Instead of having own advantages of structural holes, sponsors lend the advantages from structural holes to ego. Figure 3.2 illustrates the lending of advantageous. Ego is embedded in a social structure, in which actors have many relations to each other. Without ego, the actors would be still connected (for example through the sponsor). The sponsor can lend the advantages of structural holes to ego. This lending position of ego creates a dependency. In order to benefit from structural holes, an individual is dependent on sponsors. If ego's connection to a sponsor deteriorates, s/he loses the benefits of the structural holes that are only accessible through this partner. For that reason, the configuration in Figure 3.2 is generally considered inferior. In contrast, if ego's social relations consists of many opportunities to span structural holes, the loss of one connection is marginal, because ego still has other brokering opportunities (Burt, 1992).

Figure 3.2: Social network with sponsor

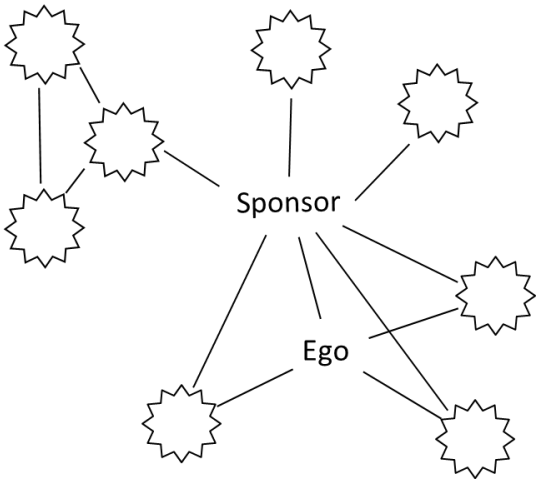

Figure 3.2 illustrates a simple sponsor network. Here, ego "lends" the advantages of structural holes from a sponsor.

Burt (1992) demonstrates the benefits of structural holes for career advancement in a study based on a representative sample of 284 senior managers of a large American electronics company with more than 100,000 employees. Burt's initial findings are supported by several subsequent studies, for example by Gargiulo and Benassi (2000), Burt (2004) and Zaheer and Soda (2009). There are also two studies that demonstrate the beneficial effects of structural holes in the academic context, but they do not explicitly examine the effect structural holes have on promotions: Oh et al. (2005) finds evidence that structural holes influence the number of publications researchers have in their record. In another such study, Lissoni (2010), shows that academics who function as brokers are associated with a large number of patents and strong publication counts.

3.2.2 Gender differences in professional networks

Apart from highlighting the general effects of different network structures, extant network studies reveal significant differences in the professional networks of males and females (Burt, 1992, 1998; Forret & Dougherty, 2004; Granovetter, 1974; Oakley, 2000; Parks-Yancy, DiTomaso, & Post, 2006; Scheidegger & Osterloh, 2004; Spurk, Meinecke, Kauffeld, & Volmer, 2015; Tesch, Wood, Helwig, & Nattinger, 1995; Tharenou, 1999). Burt (1998) shows that there are differences between the networks of successful men and successful women with respect to structural holes: men benefit more from networks that afford them the chance to occupy many structural holes, while women benefit more from the inferior and more risky networks that contain few structural holes. In such networks, women have to rely on the support of sponsors in order to benefit from the structural holes. To explain these differences,

Burt (1998) concludes that women have less legitimacy within an organization and therefore need a different network configuration compared to their male colleagues in order to achieve success.

The theory of social identity (Tajfel & Turner, 1986) helps us to understand how differently configured individual networks affect the degree to which women and men benefit from them. The theory predicts that individuals develop a positive self-image by comparing their own group to other groups. Gender is one aspect of an individual's social identity (Ely, 1994). Many authors whose works are grounded in social identity theory find that, on the whole, in organizations women have a lower status than men, who traditionally occupy high-level positions (Chattopadhyay, 2003; Ely, 1994; Ridgeway, 1988; Tsui, Egan, & Oreilly, 1992). According to these works, in order to improve their position, low-status members (i.e., women) typically prefer to identify with a higher status out-group (i.e., men) and find interactions with female in-group members less attractive (Chattopadhyay, George, & Lawrence, 2004; Ely, 1994). As a result, women identify with those of their peers who belong to a high-status work group and not with other women (Chattopadhyay et al., 2004). This behavior influences the development of women's professional networks: women who work and connect with close male peers may come to occupy few structural holes, but are likely to lend benefits from a sponsor. This suggests that having an influential sponsor and being part of a network with influential colleagues is one of the strategies that allow women to break the glass ceiling (Ragins, Townsend, & Mattis, 1998). In contrast, for men it is not necessary to stick to a specific group to improve their status. They can network more freely and connect with more distant peers in order to occupy structural holes. This suggests that the gender-related differences described further up can be attributed to the attempts of women to improve their status or increase their legitimacy by using sponsors to gain benefits.

3.2.3 Numeric representation and token theory

Although the legitimacy deficit that women have to cope with explains the differences in the network structures that the two genders most benefit from, the causes of this deficit have yet to be addressed in the network literature. Drawing on token theory (Kanter, 1977a), we suggest that within organizations, the legitimacy deficit is related to the proportion of women among staff. The idea behind token theory is that a small minority with shared characteristics (in this case gender) have certain disadvantages in the work context (Yoder, 1991). Kanter (1977b) distinguishes between different minority situations: she described minorities between 15% and 40% of a population as *tilted groups* and minorities of less than 15% as *skewed*

groups, whose members she called "tokens". In her work, Kanter (1977a, 1977b) focuses particularly on skewed groups and their effects on token members.

Both Kanter and other researchers identify three main disadvantages that result from being a token: first, tokens are more visible to their direct peers than the rest of the group and for that reason under more performance pressure (Kanter, 1977b; Roth, 2004). Second, the majority group can easily exaggerate the differences between itself and the skewed group and thus isolate the latter: "*tokens are by definition too few in number to prevent the application of familiar generalizations or stereotypes*" (Kanter, 1977b: 971). By isolating women, the dominant majority prevents them from gaining equal access to elite or important networks (Bevelander & Page, 2011; Brass, 1985; Forret & Dougherty, 2004; Grugulis & Stoyanova, 2012; Kanter, 1977b; Oakley, 2000; Roth, 2004). This mechanism is similar to the practice that social identity theory describes, through which in-groups reinforce their self-perception by developing coherence and confidence (Elstad & Ladegard, 2012). Lyness and Thompson (2000) as well as Forret and Dougherty (2004) also identify a similar mechanism of isolation in their studies on network exclusion.

Third, tokens are associated with *assimilation* or *role encapsulation*. This means that the dominant group has specific distorted expectations of how tokens behave and of the abilities they possess. Because tokens are a minority, the majority can easily perpetuate this distorted perception in order to fulfill predicted generalizations (Kanter, 1977a). Cohen and Swim (1995) show that the mere anticipation of being a token member leads potential tokens to expect that others will stereotype them. Often, women in token positions accept and even act in line with such stereotypes in order to gain acceptance (Timberlake, 2005).

Kanter describes her token theory as gender-neutral, in the sense that the disadvantages that result from being a token were assumed to apply equally to women and men. However, later studies found that while women are typically affected negatively by token positions, men are not (Cognard-Black, 2004; Floge & Merrill, 1986; Lo Coco, Gullo, Lo Verso, & Kivlighan, 2013; Pazy & Oron, 2001; Ridgeway, 1988; Sackett, DuBois, & Noe, 1991; Yoder, 1991; Yoder & Sinnett, 1985; Zimmer, 1988). The differences in the effects that token status has on men and on women can be attributed to different expectations. Sharing the characteristics of people who have already achieved success signals superiority (Lyness & Heilman, 2006; Roth, 2004). Because the experience of the past determines expectations, the male and often also the female members of a group ascribe to men higher status (Ely, 1994; Ridgeway, 1988)

and generally view men, who have traditionally dominated the top ranks in most organizations, as better qualified and more suitable for senior positions than women (Roth, 2004; Schein, 1973, 1975).

One consequence of this pattern is that decision-makers who aim to reduce risk will prefer to promote candidates who are similar to already promoted employees. According to the proven success model, these candidates are male (Van den Brink & Benschop, 2013). This self-perpetuating mechanism easily leads to the expectation that men will perform better on a wide range of tasks (Fiske, Cuddy, Glick, & Xu, 2002) and, because men will be selected more often than women for these tasks, this expectation will become a self-fulfilled prophecy. As a result, the negative effects of token status will not affect men as long as the authority structure is typically male (Ridgeway, 1988). This might explain the legitimacy deficits that women face and that Burt (1998) describes in his analysis of the differences between the ways in which women and men benefit from network configurations, which we discussed above.

Although expectations and ascriptions of status are influenced by past experience, there is evidence that attitudes change when the proportion of women in the workforce increases, which in turn leads to changes in the way individuals are seen and evaluated (Azmat & Petrongolo, 2014). According to social-identity theory, in groups characterized by a strong imbalance between a numeric minority and the majority, negative stereotypes and status differences between members of low and of high status are more pronounced, compared to more balanced settings (Duguid, Loyd, & Tolbert, 2012). Ely (1994) suggests that an increase in the proportion of women in higher positions positively influences the status of women throughout an organization. A greater gender balance at the top signals that women are capable of reaching upper positions and do not belong to a lower-status group (Ely, 1994). Stereotypes are likely to fade when more women are present and information about their true behavior is pervasive (Kanter, 1977b). In such settings gender identity is no longer problematic and identifying with other women is not perceived as identifying with a low-status group (Ely, 1994).

A number of studies have shown empirically that increasing the ratio of women in the workforce has several effects. Snizek and Neil (1992), who conducted a survey at an Australian government agency with more than 7,100 employees, shows that the likelihood of women facing discrimination decreases as their proportion in a group increases:

"[It] appears to us that were more women to be present in men's career streams, all other things being equal, discrimination toward women would slowly diminish." (Snizek & Neil, 1992, p. 423)

An Israeli study by Pazy and Oron (2001), based on data from standard appraisals of performance among military officers, shows that the token status of females is linked to negative effects: the authors find that women's performance was rated lower than that of men when women were tokens in their units. This, however, changed when women ceased to be tokens. In a salary study, Cohen and Huffman (2007) finds that gender-related wage inequality decreased as the proportion of females in a higher-status position increased.

Although several empirical studies confirm, on the whole, the negative effects of token status, the theory on which this research rests has received some criticism from scholars who question these effects (e.g., Fuegen & Biernat, 2002; Hammond & Mahoney, 1983). Discussing this criticism at length is beyond the scope of this paper; however, a few prominent studies need to be mentioned: Simpson (1997) sets out to investigate whether anything had changed since Kanter proposed her theory. To that end, Simpson conducts interviews and surveys, using a sample of 250 MBA graduates, and concludes that despite progress for women in general, token women in particular still face career barriers, so numerical under-representation in a group remains a problem. King, Hebel, George and Matusik (2010) enter the discussion by linking the negative effects of having token status to the psychological climate individuals perceive. The authors argue that although organizations could alleviate these negative effects by creating an equitable gender climate, if proportional under-representation and token status are not addressed, negative perceptions and experiences will persist. The same authors also argue that critics fail to present a coherent alternative to token theory. Therefore, we use the tokens approach as a solid theoretical framework.

3.2.4 Linking network analysis with token theory

We draw on token theory to shed light on how different network structures affect the status and prospects of men and women and concluded that increasing the proportion of female staff in higher positions within an organization should diminish the disadvantages that are typically associated with the token status of females, such as isolation, negative stereotyping or biased evaluations. We expect that such changes will also affect how women behave within a network in several ways.

First, a more balanced gender proportion signals to aspiring females that higher organizational positions are within their reach and that their gender is not associated with a lower-status group (Ely, 1994). Furthermore, in non-token situations women do not need a sponsor: they have legitimacy among their peers and can network in the same way as men. Once women cease to function as tokens, they will gain equal access to networks that were previously only partly accessible. Moreover, the greater the relative number of women, the harder will it become for the male majority to exclude the female minority from specific networks.

Second, as Kanter (1977a) argues, increasing the presence of women in a workforce means that information about how they truly behave will become pervasive, which should make it easier to refute generalizations and stereotypes. Having more women in advanced positions should change the impression that men are more suitable for these jobs: while a single woman in a top post can easily be seen as an exception, when several women occupy top posts, this conviction becomes baseless.

There are several studies that lend some support to our argument: studying the creation of soft and hard social capital in a nearly gender-balanced academic setting, Van Emmerik (2006) finds very few differences between the networks of men and women. Similarly, in their study of a large financial service firm, Gargiulo et al. (2009), find no gender-related network effects. With the same network structure, both genders receive similar bonus payments. In contrast to Burt (1992), these authors do not find that women benefit more from a different network structure. We should note that in their study women constituted 24% of mid-ranking staff (*associates*) and according to Kanter (1977a) such a percentage should not lead to the disadvantages of token status.

In sum, while some researchers find that gender does not seem to influence the way in which individuals benefit from their networks (e.g., Gargiulo et al., 2009; Liu, 2015), others find that it did (e.g., Burt, 1998). We argue that these contradictory findings can be explained by differences in the token status of women in the respective settings. In a setting where the proportion of females is low, women are most likely to achieve success by following Burt's advice and developing networks with few structural holes. In a setting where the gender ratio is more balanced, i.e., where the proportion of females is above 15%, women are most likely to succeed by building a network with many structural holes – which is contrary to what Burt (1998) suggests.

This interpretation fits with our argument that the problems of legitimacy or status that women face in many organizations can be attributed to the low share of females in advanced positions within these organizations. In other words, when enough women are present or these problems either never arise or, if they do, their negative effects are so weak that the best strategy for women, as for men, is to occupy many structural holes. To put our conclusions in more formal terms, we expect that the proportion of women on advanced levels moderates the effect of structural holes on the speed with which both the female and male members of an organization get promoted (see Figure 3.3). These conclusions lead to the following hypotheses, which we will put to the test in the light of our empirical findings.

Hypothesis 1a: *Women in token positions who occupy many structural holes are promoted more slowly than women in token position who occupy few structural holes.*

Hypothesis 1b: *Women in non-token positions who occupy many structural holes are promoted faster than women in non-token position who occupy few structural holes.*

Hypothesis 2a: *When women are in token positions, the effect of occupying many as compared to few structural holes on their promotion speed is different from the effect of these two network configurations on the promotion speed of their male colleagues.*

Hypothesis 2b: *When women are in non-token positions, the effect of occupying many as compared to few structural holes on their promotion speed is identical to the effect of these two network configurations on the promotion speed of their male colleagues.*

3.3 Method

3.3.1 Sample

Our analysis relies on a full-scale sample of 844 professors at a Swiss university who had reached one of the following ranks in 2013: assistant professor, associate professor, full professor and "titular professor".[5] The latter is an honorary title that carries teaching duties, but has no claim on a chair. We chose this particular university because it is one of the biggest and most diversified universities (i.e., with the broadest range of disciplines) in Switzerland. In our sample we include only staff eligible for one of the professorial titles listed above. The dataset covers the period 2008–2013. We decided to focus on professors, rather than all employees, because in the higher ranks women are still under-represented and more likely to be affected by tokenism than in the lower ranks (Simpson, 1997). We consulted a number of

[5] In the rest of the paper, we will use the term professor to refer to any of those titles and posts.

different sources to create a unique dataset that suited our purposes. All information used is either available to the general public or at least to all members of this particular university and has been collected by hand. Whenever possible, to create our variables we use official databases and lists (such as lists of courses, committee members, etc.). When this was not possible, we use the professors' publicly available CVs.

A major advantage of analyzing network data from universities is that universities comprise faculties that work independently of each other. The university we chose consists of seven faculties that are subdivided into a total of 168 departments. On average there are 4.7 professors per department; however, the departments vary strongly in size: in some there is only one professor, while the largest department numbers 75 professors. The proportion of female professors also varies strongly among the seven faculties, ranging from 5.8% to 34.8%. During the sample period, the university employed 844 professors, 22.9% of whom were females. In the entire sample (all years) 39.9% of the professors had reached the highest possible hierarchical level, i.e., they were tenured (employed) as full professors. Further, 15.4% were associate professors (also tenured), 8.7% were assistant professors (mostly untenured) and 27.5% were titular professors with notable appointment (mostly tenured). The remaining 8.4% were scholars who became appointed to a professorial position by 2013 but after the first observation.

In general, academic staff has the chance to get internally promoted from the position of assistant professor or senior lecturer to that of associate professor and eventually to a full professorship. Haeck and Verboven (2012) show that in Europe, a university can function as an internal labor market, with entry at lower ranks and exit at the highest ranks. In our case, university performance (indicated, for example, by the publication record) is an important factor in achieving internal promotion. However, having supporters high up in the hierarchy and the backing of the department, the faculty and the university management is a definite advantage. As in other countries (Van den Brink, 2011), networks play an important role in the advancement of academic careers in Switzerland. Who gets promoted is not decided by a single person but by a group of people on different hierarchical levels. For those reasons, our sample is highly suitable for testing how structural holes affect internal promotion and whether there are differences that can be related to the gender of candidates and the proportion of women in a faculty.

3.3.1.1 Social network data

To analyze the professional networks in our case university, we chose to measure the embeddedness of the professors in the context of the university as a whole. We construct the measurement by analyzing ego networks and by matching four types of data on objective affiliations: first, we identify the ties between researchers on the basis of co-authorship. This approach is in line with other studies examining the social networks of researchers (e.g., Balconi, Breschi, & Lissoni, 2004; Liu, 2015; McFadyen & Cannella Jr, 2004; McFadyen, Semadeni, & Cannella Jr, 2009). To collect information on the publication records of all researchers, we use a publicly accessible central university database. Because of reporting regulations, all researchers at our sample university are obliged to list all of their publications in this central database and to update this list once a year. We use co-authors, who also have to be listed, as a network tie, regardless of their university affiliation or hierarchical position. This approach allows us to identify potential opportunities for brokering, even if these involve researchers from different universities or in lower ranks (such as PhD-students or postdocs). In total, we identify 86 114 authors who functioned as network ties.

We also identify networks on the basis of collaborations. At the sample university, all professors have very similar teaching duties and are free to collaborate on a course or seminar. To generate the social network of our sample, we also use teaching collaborations to link professors who taught a course or seminar jointly. We think this is an innovative and promising approach to visualizing the social networks that grow among scholars of the same university. We collect data for every semester from the official course listings. Because most of our other data cover periods of one year, we merge all data covering two semesters to obtain an annual figure. In total, we use 19 334 course units[6] taught by at least two lecturers each to create network ties.

The third type of network ties we use reflects membership of a university committee. Drawing on an official university database containing information on the university's 54 committees and their members, we measure each professor's committee membership. Committees connect all faculties and are responsible for specific areas, such as student affairs. The candidates for joining a committee are nominated either by the respective committee or by the university management, which implies that potential members need to obtain positive recommendations and to be well known among staff. Often, joining a committee is the result of informal ties between one or two existing members and the successful candidate. The

[6] *Course unit* refers to a module or similar unit of study that is part of a university course.

committees are open to candidates among pre-tenure academic staff and university regulations demand that they comprise representatives of all ranks. Depending on the size and importance of the committee, even students and postdocs can be elected as representatives. Women are not especially encouraged to join committees just because of their gender. The proportion of women in committees (21.88%) is nearly the same as in the overall sample (22.9%), which indicates that women are not over- or underrepresented. Overall, 321 university members are affiliated with at least one committee. In this subsample, a professor is affiliated with 1.48 committees on average.

Similarly, the fourth type of network ties we use reflects membership of a competence center. In addition to the 54 committees, the case university also has 64 so-called competence centers, which are research groups for specific areas, such as human rights. Like committees, these centers also connect different faculties and departments. We measure each professor's membership of every competence center to which s/he belonged. Each such network includes the focal professor and the other members of that center. New members are mostly put forward by the respective competence center, which again implies that the candidates' interests have to be well known and that membership is the result of informal ties. We collect our data from the webpage of each competence center, which includes a list of members. However, we were not able to collect data on past members and on when each member joined. We therefore decided to include ties generated from membership data only for 2013. This means that the social network data for the period 2008–2012 do not include ties resulting from membership of competence centers, because we could not ascertain when a professor joined the center. To check the validity of this procedure, we compare the network information we have for 2013 with that for 2012 and conduct our analysis without the 2013 data. Although the results are slightly weaker, we do not find significant differences, so we decided to include the rather limited network data we had on the competence centers. In the entire sample, 417 professors are members of one to four competence centers. In this subsample, a professor is affiliated with 1.62 centers on average.

To conduct our analysis, we use structural data. In the case of membership to committees and competence centers, we only measure the opportunities each professor had to make new contacts. To verify that the members of committees and competence centers indeed knew each other sufficiently well and that membership enabled professors to form ties to other members in either type of group, we conduct several interviews with the members of these

bodies. Both conjectures are confirmed: we find that, after joining, new members did indeed create ties to the other members.

To create our network variables, we match all four networks; i.e., networks based on co-authorship, collaborations, membership of a university committee and membership of a competence center. The first two measurements (co-authorship and collaborations) account for more than 90% of the ties.

3.3.1.2 Dependent variable

Years without internal promotion. Our dependent variable measures the career advancement of professors (excluding full professors, once they have reached this status). In line with similar studies (e.g., Danell & Hjerm, 2013; Jungbauer-Gans & Gross, 2013; Sabatier, 2010; Sabatier, Carrere, & Mangematin, 2006) to measure career success in academia, we look at the speed of internal promotion. More specifically, we count the number of years that individuals who were eligible for promotion had spent in their current position without getting promoted. Higher values thus indicate slower career progress. To generate this variable, we use official course listings, which offer detailed information on each professor's career.

3.3.1.3 Independent variables

Structural holes. To measure a professor's success in a network, we use the number of structural holes that an individual occupied, using Burt's constraint measure *C* (1992). This measure accounts for the size, density and hierarchical structure of a network. Using the number of structural holes to derive this measure, which is the reverse indicator of constraint (*1-C*), enabled us to simplify the interpretation of our results.

Constraint reflects the extent to which ego's network partners are connected to one another. Lower values of constraint imply that it is more likely for an individual to bridge structural holes, while higher values indicate that it is less likely. Here, *C* is the squared proportion of $\sum_j c_{ij}$ and measures the concentration of direct and indirect ties in a single contact. An individual *i* is constrained with regard to her/his network opportunities when *j*, who is one of *i*'s contacts, has a direct connection to *q*, who is also one of *i*'s contacts. This constrains *i*, because *q* is not exclusively related to *i*. In other words, *j*'s relation to *q* restricts *i*'s opportunities to occupy a structural hole.

To measure constraint $\left(p_{ij} + \sum_q p_{iq} p_{qi}\right)^2$ for $q \neq i,j$ we reason as follows: if ego's potential trading partners are highly interconnected, ego is highly constrained and spans only few or no

structural holes (see Figures 3.1 and 3.2 for examples). In line with previous studies (e.g., Burt, 1998; Zaheer & Soda, 2009) we assume that an individual's opportunities for brokerage increase with the number of structural holes that s/he occupies (Burt, 2007). For further details about structural holes and how the measure is derived, see Burt (1992, pp. 50–70).

Female. We measure the gender of a professor as a binary variable (0= males, 1= females).

Proportion of females. On the basis of the official statistics provided by the university, we code the proportion of female professors in a faculty in every year (excluding lower ranking employees, such as clerical staff and postdocs, but including all assistant, associate, titular and full professors). In the dataset, 60% of all females are women in token positions, meaning they form a subgroup smaller than 15% of a larger group (Kanter, 1977b).

3.3.1.4 Control Variables

In our regression we control for performance as an indication of talent. To measure performance we check whether a professor held a position on the editorial board of an academic journal, studied at a top university and consulted the publication index. We also control for prior work experience, counting the number of past memberships in other organizations. Finally, we control for the number of committees and competence centers of which an individual was a member, as well as for the sizes of the department and of the network to which s/he belonged. The choice of these variables, which we will discuss in more detail further down, is in line with previous studies in an academic setting (Ginther & Hayes, 2003; Judge, Kammeyer-Mueller, & Bretz, 2004; Lawson & Shibayama, 2013; Liu, 2015). In addition to these variables, we include in the regression models fixed-effect dummies to control for a specific year, faculty and professorial rank.

Publication index. It is not easy to compare the publication performance of academics in different disciplines and at different stages in their career. Typical citation metrics, such as Hirsch's h-index (2005) or Egghe's g-index (2006) deliver biased results in such cases. The metric we use to measure publication performance is the *hI,annual index*, which is a better measurement when researchers are at different career stages and work in different disciplines, because it includes discipline-specific controls, such as the number of co-authors (Harzing,

Alakangas, & Adams, 2014).[7] To generate this index we use the software Publish or Perish 4, which processes data retrieved by Google Scholar.

Signaling talent. Signaling talent, i.e., credibly conveying attractive information about oneself to another party, is important in job markets and for promotion (Bjerk, 2008; Spence, 1973). In academia, the university where a professor has been educated or was previously employed plays an important role in that professor's quality assessment. A previous affiliation with a highly respected university, such as Harvard or Stanford, for example, conveys credibly positive information about a professor's abilities to her/his peers and to prospective employers and improves the outcome of a quality assessment. In our case study, we record the university where the professors had received their PhD or had gained a postdoctoral qualification, both of which are prerequisites for a professorship in many European countries. When a university was included either in the Top 200 of the QS World University Ranking 2012 or in the Top 200 of the Times Higher Education Ranking 2012–2013 we code this university with 1, and if it was included in both lists, we code with 2. We then calculate the mean of the number of universities an individual had attended up to the point of our data collection. For example, a professor who had completed her/his PhD and gained a postdoctoral qualification at universities included in both lists was assigned 2, which represents the highest degree of signaling. In contrast, someone formerly employed at three different universities of which only one is included in either of these lists would receive a much lower 1/3. To generate this and the next two control variables we look at each professor's CV.

Editor and board positions (log). Professional scientific journals are the primary publication outlets of research communities. The editorial boards of these journals play a considerable role both in the dissemination of information and in its evaluation by an expert audience. Their members tend to be regarded as experts in their field (Kaufman, 1984). Being appointed to an editorial board is not only a great honor, but can also be seen as an indicator of scientific quality. Gibbons and Fish (1991, p. 364) confirm this idea: "*Certainly, the more editorial boards an economist is on, the more prestigious the economist.*" Consequently, serving on an editorial board can be regarded as indicative of scholarly quality among one's peers (Frey & Rost, 2010). In our sample, we count the number of positions that a professor held as editor or board member of an academic journal.

[7] As a robustness check, we used other measures as controls, such as the h-index and the g-index. Our main results did not change, so we decided to use hI,annual which seems to be the most reliable measure for comparing different disciplines.

Different organizations (no.). We count the number of universities at which an individual had been employed before taking up the position at our sample university. This control can be seen as a measure of academic experience and has already been used in studies on networks and career success (e.g., Seibert et al., 2001). We include all universities at which an individual had been employed for at least 6 months after the completion of her/his PhD.

Committee memberships (no.). This variable reflects the number of committees on which an individual serves as a member; in other words, a measure for the size of the personal network. Given that larger networks offer more opportunities to occupy structural holes, but also require more time and effort for networking, we use this variable to control whether individuals benefit from the structure of their network or merely from having a larger network.

Competence center memberships (no.). This variable reflects the number of competence centers of which an individual is a member. Again, we use this variable to distinguish between the effects of a network's structure and of a network's size.

Department size. This variable measures the number of an individual's colleagues with a professorial title in the same department. Larger departments might offer more opportunities for networking, because the members of the same department are more likely to work together and might thus benefit from building a network. At the same time, larger departments may mean a higher constraint and thus fewer opportunities to bridge structural holes.

Network size. This variable represents the number of actors that an individual is directly connected to. This variable represents all potential sources of contact; namely, co-authorship, collaborations, committee membership and membership of a competence center.

3.3.2 Analysis

To test our hypotheses, we use the set of longitudinal data covering the period 2008–2013 to construct a random-effects model with *years without internal promotion* as the dependent variable. We use a time lag of one year for all publication data, meaning that the network built on the basis of co-authored papers published in 2013 was regressed against the 2012 values of other covariates. We expect that authors collaborate on a joint work for at least one year before publication.

To test the predictions of Hypotheses 1a and 1b, we start by including only females, in order to keep the model as simple as possible. The inclusion of one interaction effect between the

number of structural holes and the proportion of professors in the faculty is sufficient for this purpose. To test the predictions of Hypotheses 2a and 2b, we subsequently include both genders in the same regression model. In this model,[8] we explicitly compare women in token positions with women in non-token positions. Instead of using a metric variable to measure the proportion of female professors in a faculty, we use a binary variable. In line with Kanter (1977b) and most authors who draw on token theory (e.g., King et al., 2010), we use 15% as the threshold for the proportion of female professors in a faculty. Following these tests, we develop the final, most complex model.

Our final model includes both genders and the proportion of females as a metric variable. This results in a complex random-effects model with the following interaction terms: *females* × *structural holes*, *females* × *proportion*, *proportion* × *structural holes* and a double interaction combine both, i.e., *females* × *proportion* × *structural holes*, to see the effects for women occupying many structural holes in faculties with a high proportion of females. The final model, which is illustrated in Figure 3.3, is a comprehensive variant of the former simpler models on which it is based.

Figure 3.3: Regression model

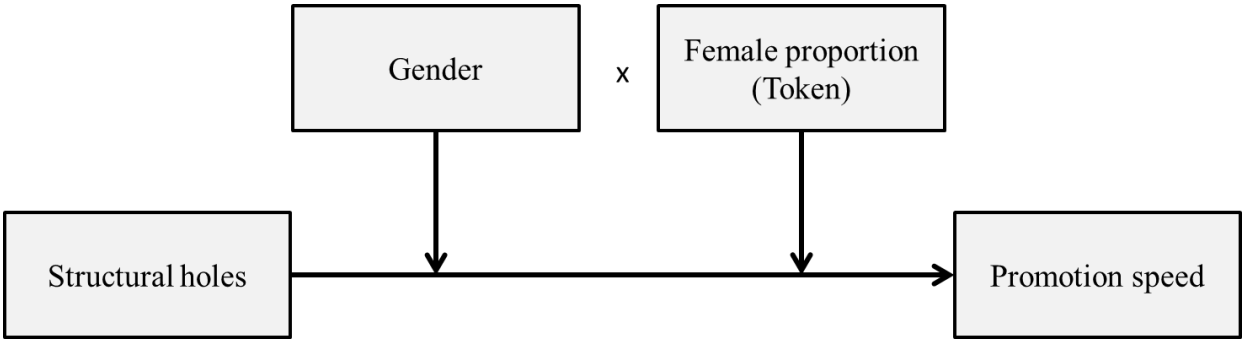

Figure 3.3 shows the model from which the results in Table 3.4 were derived.

[8] In this model we did not include all the faculty fixed-effects dummies, because in some faculties there are only token women, while in other faculties there are only non-token women in every year within our sample period. For that reason, the fixed effects correspond to three faculties that comprised both token and non-token women within our time frame. We also regress the model without any faculty dummies, but this did not change our main results.

Table 3.1: Descriptive statistics

	Variable	Obs	Mean	Std.Dev	Min	Max	1	2	3	4	5	6	7	8	9	10	11
1	Years without internal promotion	2109	4.355	4.134	0	31	1										
2	Publication index	2109	0.825	0.612	0	3	-0.153	1									
3	Signaling talent	2109	1.031	0.874	0	2	-0.044	-0.044	1								
4	Editor/board (log)	2109	-0.231	0.522	-0.431	2.267	-0.072	0.081	0.062	1							
5	Different organizations (no.)	2109	0.702	0.819	0	4	-0.184	0.064	0.012	0.166	1						
6	Committee member. (no.)	2109	0.078	0.311	0	3	0.080	-0.060	-0.037	0.002	0.043	1					
7	Competence member. (no.)	2109	0.741	0.942	0	4	-0.089	0.278	-0.050	0.076	0.139	0.106	1				
8	Department size	2109	13.496	18.071	1	75	0.156	-0.325	0.043	0.022	0.012	-0.009	-0.113	1			
9	Female	2109	0.230	0.421	0	1	-0.076	-0.125	0.038	0.022	0.056	-0.002	-0.085	-0.053	1		
10	Proportion of females	2109	0.151	0.095	0.058	0.348	0.074	-0.467	0.025	0.063	0.190	0.022	-0.082	0.360	0.101	1	
11	Network size	2109	82.678	90.188	0	593	-0.040	0.510	0.038	-0.064	-0.116	0.019	0.236	-0.296	-0.146	-0.455	1
12	Structural holes	2109	0.894	0.157	0	1	-0.056	0.254	-0.018	-0.057	-0.050	0.044	0.144	-0.224	-0.030	-0.348	0.338

3.4 Empirical findings

Table 3.1 summarizes the descriptive statistics and the bivariate correlations of our variables. Table 3.2 contains the empirical results of the regression in which we included only females. In Model 1a we use only the control variables. The results show that no variable has a significant effect on the speed with which female professors are promoted. Model 1b additionally includes the network variables and the fixed-effects. Here we find that the main effects that the number of structural holes ($p<0.01$) and the proportion of females within a faculty ($p<0.05$) have on the speed with which female academics are promoted are significant. The interaction effect between the number of structural holes and the proportion of females within a faculty ($p<0.01$) is also significant.

Table 3.2: Random-effect regression, with proportions, females only

Variable	**Model 1a** B (SE)	**Model 1b** B (SE)
Publication Index	0.02 (0.52)	-0.27 (0.63)
Signaling talent	-0.42 (0.34)	-0.19 (0.36)
Editor/Board (log)	0.81 (0.50)	0.75 (0.49)
Different org. (no.)	-0.34 (0.31)	-0.34 (0.37)
Committee member (no.)	0.86 (0.75)	0.52 (0.77)
Competence member (no.)	-0.06 (0.35)	0.24 (0.36)
Department size	-0.01 (0.02)	-0.03 (0.04)
Network size		0.00 (2.49)
Structural holes		7.28** (10.16)
Proportion of females		19.98* (8.12)
Proportion × struct. holes		-23.13**
Constant	4.67*** (0.76)	0.57 (3.84)
Year fixed-effects	No	Included
Faculty fixed-effects	No	Included
Professorial fixed-effects	No	Included
R-sqr	0.04	0.10
Wald-Chi2	5.70	91.25***
N	486	486
N-groups	116	116

Table 3.2 predicts *years without internal promotions* on the basis of the number of females and using the proportion of females as a metric variable.
In the table significant levels are highlighted as follows: †< p. 0.10; *< p 0.05; **< p 0.01; ***< p 0.001.

Figure 3.4 illustrates the results of this analysis. In line with Hypothesis 1a, the findings show that women in token positions who occupy many structural holes are promoted more slowly than women who occupy few structural holes. The findings also confirm that women in non-token positions who occupy many structural holes are promoted nearly 3 months earlier than women who occupy few structural holes, in line with Hypothesis 1b. Again, none of the control variables are significant.

Figure 3.4: Promotion differences of women based on metric proportion

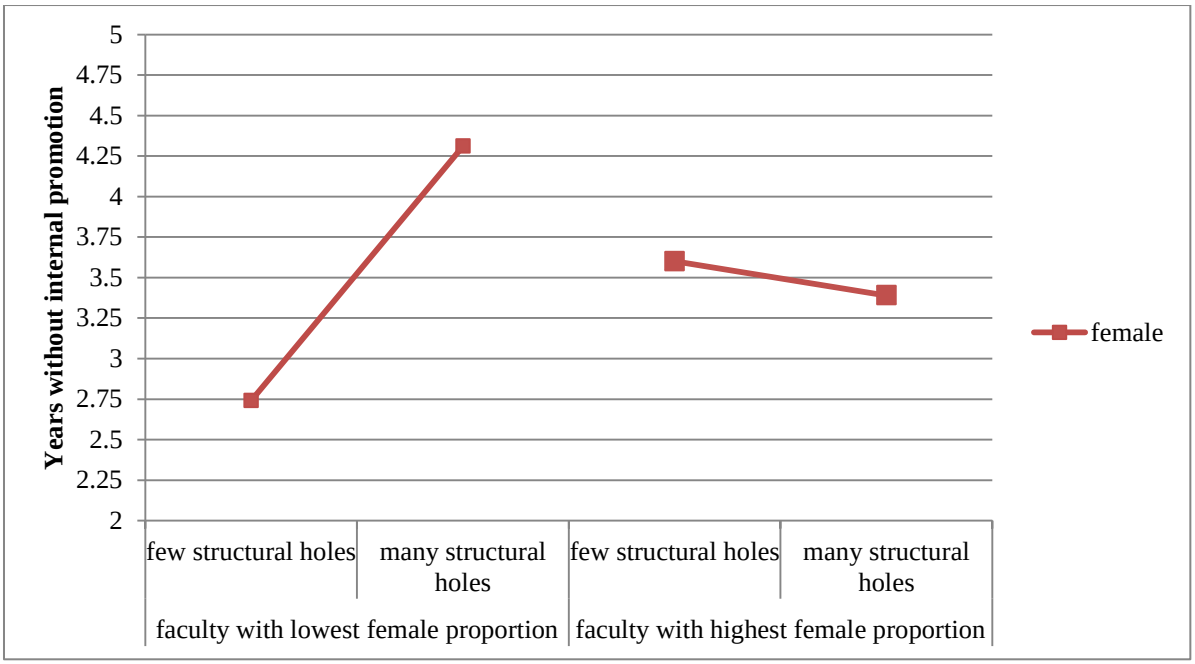

Figure 3.4 illustrates the results of Table 3.2, Model 1b.

The results of the analysis we ran to test Hypotheses 2a and 2b and to validate the findings we derive from testing Hypotheses 1a and 1b, are displayed in Table 3.3. Models 2a and 2b correspond to faculties in which women are in token situations, while Models 2c and 2d correspond to faculties in which women are in non-token situations. In Models 2a and 2c we include only the control variables, while in Model 2b and Model 2d we include all network variables, gender, the interaction between gender and structural holes, and the fixed-effects. In Model 2b the interaction effect between gender and structural holes is positive and significant ($p<0.05$), which supports Hypothesis 2a and lends further support to Hypothesis 1a. This finding indicates that in token situations women and men benefit from differently structured networks. In Model 2d the interaction effect between gender and structural holes is not significant, which supports Hypothesis 2b.

Table 3.3: Random-effect regression, with token split

Variables	Model 2a Faculty with token women (≤ 15%) B (SE)	Model 2b B (SE)	Model 2c Faculty with non-token women (> 15%) B (SE)	Model 2d B (SE)
Publication index	-0.64†	-1.19***	-0.27	-1.21†
	(0.34)	(0.36)	(0.56)	(0.67)
Signaling talent	-0.04	-0.08	-0.50	-0.46
	(0.21)	(0.21)	(0.33)	(0.33)
Editor/board (log)	0.45	0.56	-0.48	-0.50
	(0.39)	(0.38)	(0.50)	(0.50)
Different org. (no.)	-0.44†	-0.35	-1.09***	-1.01**
	(0.26)	(0.26)	(0.31)	(0.32)
Committee member (no.)	1.75***	1.44**	1.07*	0.84†
	(0.45)	(0.45)	(0.49)	(0.49)
Competence member (no.)	0.18	0.10	-0.47	-0.65†
	(0.20)	(0.21)	(0.32)	(0.34)
Department size	0.01	0.00	0.01	0.01
	(0.03)	(0.03)	(0.01)	(0.01)
Female		-4.65*		-0.65
		(1.98)		(0.88)
Network size		0.01***		0.01***
		(0.00)		(0.00)
Structural holes		-0.68		-1.26**
		(0.96)		(0.43)
Female × struct. holes		4.97*		0.42
		(2.09)		(0.75)
Constant	5.07***	5.45***	6.46***	7.57***
	(0.54)	(1.05)	(0.73)	(0.88)
Year fixed-effects	No	Included	No	Included
Faculty fixed-effects	No	Included	No	Included
Professorial fixed-effects	No	Included	No	Included
R-sqr	0.04	0.06	0.15	0.16
Wald-Chi2	92.21***	171.23***	79.61***	110.98***
N	1363	1363	746	746
N-groups	347	347	247	247

Table 3.3 predicts *years without internal promotions* on the basis of both genders and by splitting the sample in faculties with females in token and non-token positions.
In the table significant levels are highlighted as follows: †< p. 0.10; *< p 0.05; **< p 0.01; ***< p 0.001.

In contrast to Model 2b, the above finding indicates that in non-token situations women and men benefit from identically structured networks. More precisely, in Model 2d the structural hole coefficient is significantly negative ($p<0.01$), which implies that both men and women benefit from occupying structural holes in the non-token situation – a finding that lends additional support to Hypothesis 1b. These results, which are illustrated in Figure 3.5, show that if women in token situations occupy just a few structural holes, they can increase the speed with which they get promoted by reducing the wait by about one year. By contrast, women in non-token situations who occupy many structural holes can increase the speed of

promotion by about 4 months. Independently of the proportion of females in a faculty, men are promoted between two and three months earlier if they occupy many structural holes.

Figure 3.5: Promotion differences between genders based on token approach

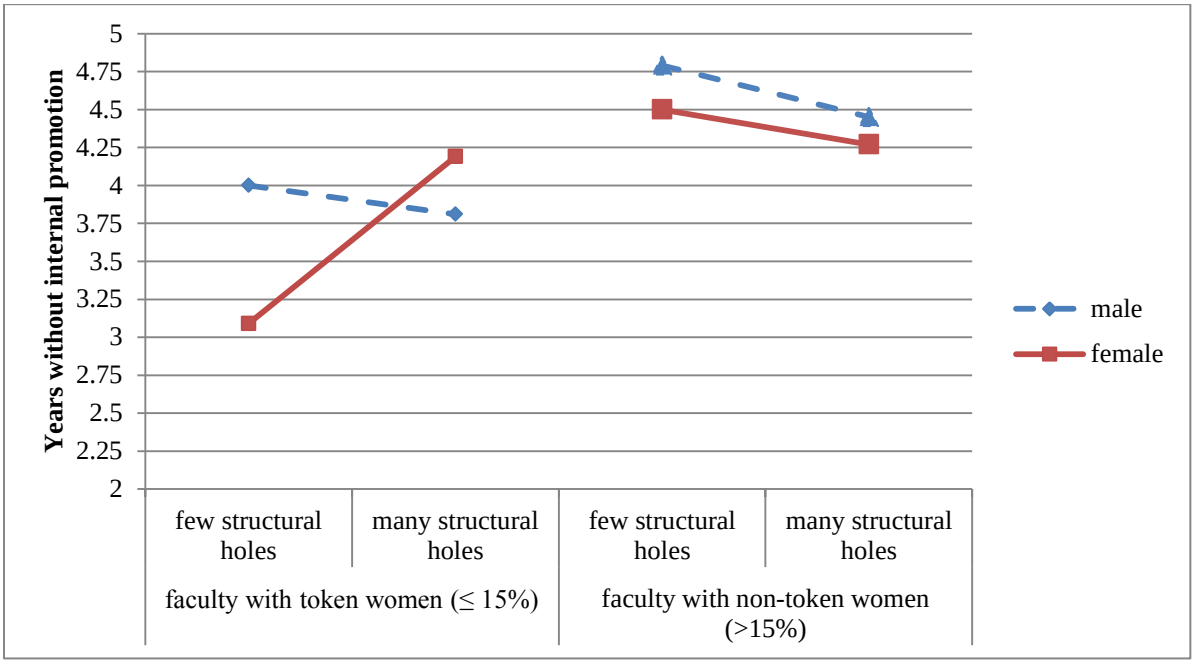

Figure 3.5 illustrates the results of Table 3.3, Model 2b and Model 2d.

Regarding the control variables, the findings show that scholars in non-token situations benefit from having experience at different universities. A strong publication performance is also important; however, the effect almost vanishes in non-token situations. On the contrary, being a member of several committees does not increase the speed of promotion for either men or women. One explanation for this finding is that the positive effects of committee membership are only visible in the results we obtain for network variables, while in this case only the negative effects of membership are visible – i.e., the fact that it is time-consuming and thus appears to slow down career progress. The variable *network size* is highly significant and positive ($p<0.001$), which shows that building larger networks is not a successful strategy and at the same time supports our assumption that the right network configuration is essential for success.

Table 3.4 shows the results of the full model, which includes men and women and uses a metric measure of proportion. In Model 3a only control variables are regressed. In Model 3b we also include gender, the network variables, the proportion of females within a faculty, all two-way interactions and the fixed-effects. In Model 3c we add the three-way interaction between gender, the proportion of females within a faculty and the number of structural holes.

The results we obtain from Model 3c again mainly support our hypotheses. The interaction effect between *female* × *structural hole* is positive and significant ($p<0.01$) and the interaction between *female* × *proportion* × *structural hole* is negative and significant ($p<0.01$).

These findings, which are illustrated in Figure 3.4 (see above) clearly confirm that in token situations women who occupy many structural holes are promoted more slowly than women who occupy few structural holes, as Hypothesis 1a predicts, and that in non-token situations, women who occupy many structural holes are promoted faster than women who occupy few structural holes, as Hypothesis 1b predicts. The findings also provide evidence that in token situations similarly configured networks have different effects on career progress, depending on a professor's gender, as Hypothesis 2a suggested. More precisely, in such situations men benefit from networks with many structural holes, while women benefit from networks with few structural holes.

By contrast, the findings lend no support to Hypothesis 2b suggesting that in non-token situations women who are having the same network configuration as men will yield the same promotion outcome as men. As this makes clear, in such situations, that women benefit from networks with many structural holes, while men have the same chances of becoming promoted independently of the number of structural holes in their networks. This last finding is not in line with the results we obtain from the simpler model presented in Table 3.3 and illustrated in Figure 3.5. The statistical complexity of the model presented in Table 3.4 may explain this difference. The promotion outcomes we derive from this more complex model result from the effects of one three-way and three two-way interactions. The model is therefore susceptible to the overestimation and underestimation of these effects, especially if the number of observations is not particularly high. This is the reason that led us to start with the simpler models. We discuss this outcome in greater detail in the next section.

Table 3.4: Random-effect regression, with proportions

Variables	Model 3a B (SE)	Model 3b B (SE)	Model 3c B (SE)
Publication index	0.28	-0.33	-0.33
	(0.31)	(0.32)	(0.32)
Signaling talent	-0.06	-0.09	-0.08
	(0.19)	(0.19)	(0.19)
Editor/board (log)	-0.27	-0.06	-0.06
	(0.33)	(0.32)	(0.32)
Different org. (no.)	-1.31***	-0.88***	-0.88***
	(0.21)	(0.21)	(0.21)
Committee member (no.)	0.86**	0.86**	0.85**
	(0.31)	(0.31)	(0.31)
Competence member (no.)	-0.09	0.01	0.02
	(0.18)	(0.19)	(0.19)
Department size	0.00	-0.06*	-0.06**
	(0.01)	(0.02)	(0.02)
Proportion of females	14.65***	14.69***	10.44**
	(1.46)	(3.60)	(3.93)
Female		-0.41	-6.17**
		(0.98)	(2.36)
Female × proportion		-4.19	16.08*
		(2.97)	(8.12)
Network size		0.01***	0.01***
		(0.00)	(0.00)
Structural holes		-0.57	-1.83†
		(1.01)	(1.11)
Female × struct. holes		0.72	7.09**
		(0.73)	(2.48)
Proportion × struct. holes		0.89	5.81
		(3.57)	(4.01)
Female × proportion × struct. holes			-22.72**
			(8.46)
Constant	2.47***	3.65***	4.77***
	(0.52)	(1.09)	(1.16)
Year fixed-effects	No	Included	Included
Faculty fixed-effects	No	Included	Included
Professorial fixed-effects	No	Included	Included
R-sqr	0.04	0.08	0.08
Wald-Chi2	154.30***	357.03***	365.66***
N	2109	2109	2109
N-groups	498	498	498

Table 3.4 predicts *years without internal promotions* on the basis of both genders and including the proportion of females as a metric variable.
In the table significant levels are highlighted as follows: †< p. 0.10; *< p 0.05; **< p 0.01; ***< p 0.001.

Figure 3.6: Promotion differences between genders based on metric proportion

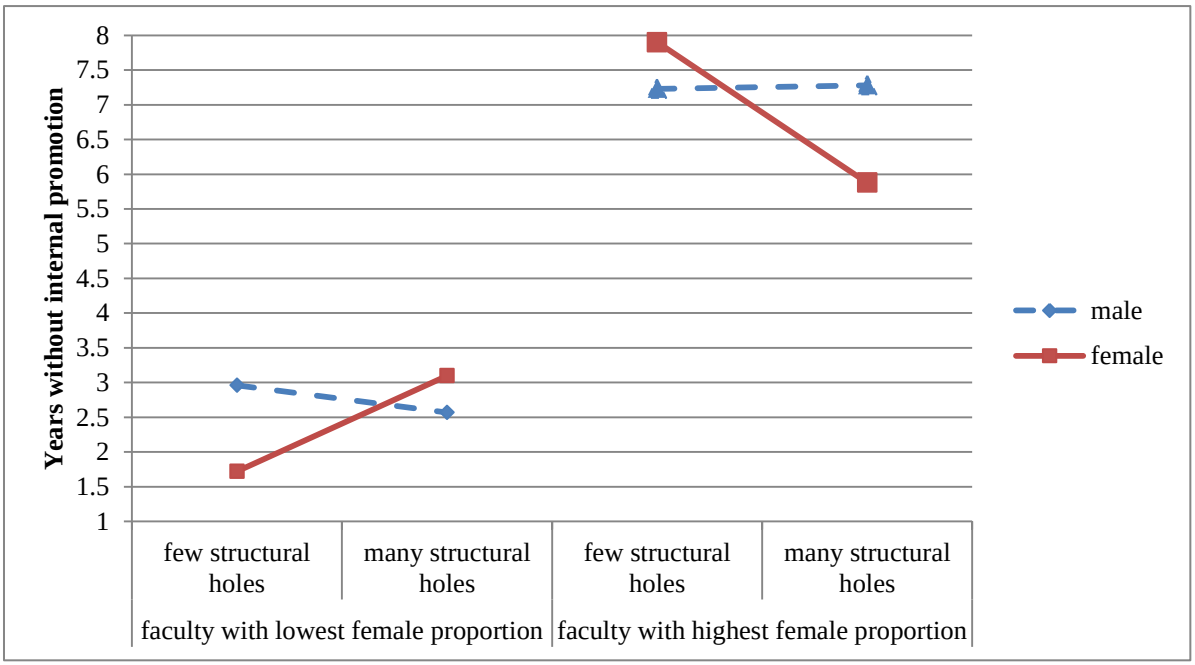

Figure 3.6 illustrates the results of Table 3.4, Model 3c.

3.5 Discussion and conclusion

Our paper combined social network theory with token theory to examine the relation between gender and career progress. To test the hypotheses we derived, we relied on data from a sample of professors at a large Swiss university. The results of our analysis suggest that gender influences the way in which the structural features of an individual's network affect her/his career prospects. More precisely, we found that when women are in token situations, i.e., when the proportion of women is below 15%, they benefit from networks with few structural holes, while their male colleagues benefit from networks with many structural holes. This result is in line with Burt's (1998) findings, which reported that men and women benefit from different network structures when it comes to career success. On the basis of our results, we can conclude that these differences can be attributed to differences in status and in expectations. Specifically, we argue that when women are tokens at their workplace, their proportion is too low to challenge negative expectations, low status and stereotypes (Ely, 1994; Kanter, 1977b). In contrast, we found that in non-token situations, i.e., when the proportion of women exceeds 15%, both men and women benefit from the same network structures. Over this threshold, it appears that a minority becomes too numerous to be isolated by the majority and too visible to be ignored by third parties. When the proportion of women increases, third parties have more opportunities to observe female behavior, which in turn

refutes stereotypes and enables women to overcome problems of status. As our results show, when women are not in a token position they can benefit from the same type of network structure as their male colleagues with regard to career success. In such settings, women do not need to use sponsors in order to benefit from structural holes, because their status and the legitimacy they enjoy allow them to occupy and benefit from structural holes directly.

This finding refutes the claim that women generally benefit from different network structures than men, as Burt (1998) had argued. It also explains why more recent studies have found no evidence for gender-specific network effects (e.g., Gargiulo et al., 2009; Liu, 2015; Watson, 2012). Moreover, in contrast to Burt (1998), we observed that women benefit from networks with many structural holes. This principle might apply to other settings, such as the film industry, where, as Lutter (2015) found, the more cohesive a network, the higher the likelihood that the careers of the female members will stall. Generally, high network cohesiveness is associated with lower chances to occupy structural holes, which means that the observations Lutter (2015) made also contradict those of Burt (1998) to some extent. Overall, our findings help explain some of the apparent inconsistencies in the literature by highlighting the influence of gender proportions on network effects. Furthermore, they provide an answer to authors (Broadbridge, 2010) who have called into question Burt's (1998) findings on the network strategies that benefit women.

Further, our results contribute to the debate about female preferences with regard to network structure. Some researchers argue that women and men generally prefer different network structures and that these gender-related differences are inherent (Bierema, 2005; Gersick et al., 2000; Timberlake, 2005), while others insist that the main determinant is the situation or the environment (i.e., differential access to opportunity of men and women) and not gender per se (Brass, 1985; Gersick et al., 2000; Ibarra, 1997). Our study provides evidence for the latter argument and shows that within an organization the proportion of women on advanced levels is an important situational factor that might influence how individuals configure their networks. In a token situation women should use personal networks that differ in their structure compared to the networks men use. But this does not imply that women generally prefer a different structure. As we pointed out, when the proportion of women is high, they benefit from the same network structure as men. As a result, former studies arguing that women prefer different structures might come to this conclusion because women chose a different structure than men in order to be successful and not because women have a general

different preference. This is in line with Moore (1990), who suggested that the networks of men and women become alike when their social structural environment becomes similar.

In our discussion of tokens versus non-tokens, we argued that the *tipping point*, at which a minority ceases to have token status, lies around 15%. While this threshold seems appropriate in the context of academic settings, in other settings other thresholds might be more appropriate. For example, there is evidence that in a business setting the presence of at least three women on a corporate board suffices to create positive effects on firm performance (Joecks, Pull, & Vetter, 2013) or on the level of firm innovation (Torchia, Calabrò, & Huse, 2011). Acknowledging that studies grounded in theories other than token theory propose higher tipping points than the percentages we chose, we included a metric proportion variable in two of the three analyses.

Overall, this paper makes three main contributions to the literature. First, we add to the small literature on gender differences in professional networks (Gremmen, Akkerman, & Benschop, 2013). Our study responds to calls for putting to the test "*Burt's assertion that senior women do better when they borrow networks [although] current research suggests that a more complex position […] is at play*" (Broadbridge, 2010, p. 827). To that end, we examined how gender ratios affect the way in which different network configurations benefit individuals, especially in the higher ranks of an organization (Hoobler et al., 2009). Our empirical results reveal that the claims (e.g., Burt, 1992, 1998) that women generally benefit more from occupying few structural holes in their professional networks are not correct.

Second, we contribute to the debate on gender-related differences in the type of network structure that works best for men and for women. Our empirical evidence shows that these differences are not inherent in gender, as many claim (Bierema, 2005; Gersick et al., 2000; Timberlake, 2005), but a result of the particular situation (Brass, 1985; Gersick et al., 2000; Ibarra, 1997; Moore, 1990).

Finally, we contribute to the literature on the benefits of personal networks in academic contexts by showing that their so far under-researched effects are an important determinant of the speed with which academics are promoted. Previous studies examined how networks influence publication performance (Oh et al., 2005) or the probability of reaching a particular step on the career ladder (Ginther & Hayes, 2003; Ginther & Kahn, 2004; Ginther & Kahn, 2006; Jagsi et al., 2011; Jungbauer-Gans & Gross, 2013; Kahn, 1993; Long, Allison, &

McGinnis, 1993; McDowell, Singell Jr, & Ziliak, 2001; Wright et al., 2003), but hardly any of these used network analysis combined with career speed.

Limitations and directions for future research

Like all studies, this one has certain limitations. First, our university dataset is somewhat idiosyncratic and, as a consequence, the findings may not be fully transferable to other types of organizations, such as private-sector companies. For example, as we discussed further up, the threshold at which women benefit from structural holes might be lower or higher in other organizational forms due to different organizational structures, different group sizes or different opportunities for collaboration among members.

Second, we used objective data, such as data based on network affiliations and instead of data based on questionnaires. On the one hand, this choice has certain disadvantages. One problem with the type of data we chose is that they provide no direct information about gender differences in behavior at the workplace and in how staff negotiates with their colleagues and employers. Both these factors are potentially important. For example, self-confidence might have an influence on the impact of token status (Cohen & Swim, 1995). On the other hand, using objective data is an advantage, because questionnaire data may be affected by a subjective bias. The use of objective data also allowed us to avoid the problem of non-random sampling that most studies on networks suffer from (Carpenter, Li, & Jiang, 2012). Several studies on social networks rely on objective data (Balconi et al., 2004; Burt, 1992; Lissoni, 2010; Oh et al., 2005) – an approach that has proved useful.

The choice of objective data is connected to the third limitation of our study; namely, that our list of control variables is rather short. Because we did not use questionnaires, the factors that we could control for, such as number of children or marital status, were limited. However, we expect that our results would not have changed significantly if we had included additional control variables, because earlier studies that did include such variables did not find that factors such as marital status had any significant effect on career success (Ginther & Hayes, 2003; Ginther & Kahn, 2004; Ginther & Kahn, 2006; Jagsi et al., 2011).

A fourth limitation is that we have no information about the course that the careers of former academic staff took once they left our sample university. It is possible that in some departments or in some faculties career prospects are generally low and more people leave to work elsewhere. The possibility that men exhibit higher mobility than women means that they

are more likely to move on to a different job and that as a consequence, the results might be skewed.

Despite their drawbacks, these limitations can be also viewed as potential avenues for future research: first, it would be interesting to see whether other studies can replicate our results by using other types of data sources drawn from other organizations, other tools, such as ego-centric questionnaires, or models with a broader range of control variables. For example, factors such as career breaks or self-confidence could help explain gender differences in career patterns in greater detail. Second, future studies could examine how different ratios of women to men relate to absolute group size and what effects the interaction of such factors has on the careers of men and women. As we indicated above, it is likely that the threshold ratio at which differences vanish increases with group size.

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4 Ownership, visibility and effort: Golf handicaps as proxies for manager's extra effort

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Abstract

Economics suggest that owners, CEOs and chairmen have different claims in a company's output, and thus these groups exert different effort. However, the effort an agent invests in her/his firm is difficult to measure. Golf handicaps enable us to look into the relationship between different degrees of ownership and their implications for the effort that agents exert. Handicaps have the advantage that they can be directly observed and can be viewed as a mirror image of manager's effort. We expect that times of crisis and changes in management positions influence golf handicaps, most for owners and, to a lesser extent, for CEOs and chairmen. Data of 440 Swiss top managers and their handicaps during eight years, from 2003 to 2010, greatly support this assumption.

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4.1 Introduction

How much effort does an employee exert in her/his firm and how can we measure this effort? These questions have been a topic of researchers for decades now. Depending on the tasks and position of the employee, several solutions have been developed. For top managers, the degree of ownership seems to be an important factor. The relationship between different degrees of ownership and their implications for the effort agents exert has been analyzed extensively in economics (e.g., Jensen & Meckling, 1976; Stiglitz, 1974). While there are many empirical tests for this relationship, we find almost no direct tests that control for the way agents allocate their time between business and leisure activities in a changing economic environment. Prior empirical research has tested this relationship (between degree of ownership and effort exerted) by using firm performance as a proxy for agent's effort (e.g., Anderson & Reeb, 2003; Core, Holthausen, & Larcker, 1999; He, 2008; Kroll, Wright, Toombs, & Leavell, 1997; Morck, Shleifer, & Vishny, 1988). Firm performance is, however, a very noisy signal for individual management performance and effort, and it is little surprise that there is no evidence of a systematic ownership-effort link (Dalton, Daily, Certo, & Roengpitya, 2003).

The present study tries to fill this research gap. We use data from a natural experiment, namely how golf handicaps of top managers have developed before and after management-position changes before the global financial crisis, i.e., from the year 2003 to 2007, and during the global financial crisis, i.e., from the year 2008 to 2010. Golf handicaps are a numerical representation of a golfer's playing potential: the lower the number, the better the golfer (McHale, 2010; USGA, 2010). This particular measurement is used because golf handicaps, which have the advantage that they can be directly observed, can be seen as a mirror image for firm effort. Improving a handicap is hard work and time consuming and thus represents time taken away from business affairs. We analyze position changes because, especially when a new position is more demanding, actors are less likely to divert their time away from the firm to leisure activities that have no direct business impact. For example, former CEOs or chairmen who buy and manage a company are more committed to the company's success, compared to their commitment in former management positions. This implies that they have less time to practice golf and to improve their handicap in their new position as owner.

This particular time interval is analyzed because, especially in a crisis, actors do not want to be seen as diverting their time away from firm activities to leisure activities. In a crisis we should expect that managers' golf handicaps worsen, because of the extra effort now needed

in their firms; managers have less time to exercise on the golf course and thus to improve their handicap.

By differentiating between three types of top managers with different degrees of firm ownership – owner-managers, CEOs and chairmen – we expect that for management-position changes and in times of crisis, golf handicaps deteriorate most for owners or for managers who have become owners. For CEOs, the handicap should also deteriorate during times of crisis, but to a lesser extent. Also, moving from a chairman position into a new CEO position should worsen the handicap. However, if the new CEO was an owner before, the handicap should improve. As far as we know, this is the first paper that uses golf handicaps as an alternative measurement for top managers' effort. By using golf handicap changes, we show that different degrees of ownership are associated with different degrees of management effort.

The remainder of the paper is structured as follows. In Chapter 4.2 we explain differences between top management actors and argue why former proxies to measure management efforts are problematic and why golf handicaps can be seen as a suitable effort proxy. In Section 4.3, we introduce our dataset. Our empirical results are discussed in Section 4.4. In Section 4.5 we conclude and give an outlook for future research.

4.2 Golf handicaps as proxies for manager's extra effort

4.2.1 Difference between management actors

Usually the three groups of actors – owner-manager[4], CEO[5] and chairman – have different claims to the company profit besides their fixed income. The owner-manager (*o*) of a firm acts as both principal and agent (Durand & Vargas, 2003). CEO (*ceo*) and chairman (*ch*) both act as agents for the owners of the firm (Jensen & Meckling, 1976). For owner-managers there is no principal-agent conflict and assuming that they own more shares than CEOs or chairmen, owners should have a higher claim to the company output.

Further, we can assume that *ceteris paribus* a CEO is more dependent on the success of a company than the chairman of the board. Chairmen are better diversified than CEOs. Usually they have shares, management roles and chairs in different firms. Therefore, they are generating income from more than one source. We also know that the compensation of CEOs

[4] In almost every case in our sample, an owner-manager is also the founder of the firm or a relative of the founder. For our argument, we do not differentiate between owner and founder.

[5] In this context, a CEO means a professional CEO holding no or only a spare share of the firm in order to differentiate CEOs from owners.

is more incentive based than the compensation chairmen receive. CEOs can leverage their compensation by increasing firm performance (Tosi, Werner, Katz, & Gomez-Mejia, 2000). Compensation of chairmen depends more on factors such as firm complexity and risk (Brick, Palmon, & Wald, 2006).

When we put these assumptions together, the result is that actors have different claims to company output, with owners having the highest claim and chairmen the lowest ($\alpha_o > \alpha_{ceo} > \alpha_{ch}$).

These different claims can be explored by focusing on managers who change their position. A manager who leaves her/his CEO or chairman position and becomes an owner-manager of a firm, e.g., by buying or founding it, should have a very high interest in being successful with her/his new firm. The new owner therefore has less time left for leisure activities and spends more time on her/his business. Similar effects should occur for a chairman who has taken over a CEO position. S/he is now more committed to a single company, and, due to typical incentive systems, has a higher stake in the company output than before. Compared to new owners, effects should be smaller for new CEOs, because of principal-agent conflicts in the CEO situation. For persons who sell their company, the new position (i.e., CEO or chairman) is associated with a lower stake in the company output, with the result that more time is diverted into leisure activities. Again, the same effect, but in a smaller magnitude, should appear for CEOs who give up their managing position in order to operate as chairman.

We assume that the income of the economic actors consists of wage *w* and some return α_i to their extra effort exerted in an economic crisis (Jensen & Meckling, 1976; Stiglitz, 1974):

$$Y = \alpha_i * \text{extra} + w; \text{ with extra} = e^{\beta} \quad (1)$$

This extra effort assumes that there is an unspecified normal effort, which is not observable. In our study, this extra effort reflects reactions by the different economic actors in a situation of economic crisis. A crisis is assumed to demand more managerial effort by the actors at the margin in order to meet specific business challenges. Originally formulated by Kahneman and Tversky (1984), the basic idea behind extra effort in crisis is loss aversion of individuals. The authors show that individuals have a higher preference in avoiding losses than in acquiring gains. If an individual loses $100, the impact on the utility is larger than when the same person wins $100 (Kahneman & Tversky, 1984; Tversky & Kahneman, 1991). Applied to a situation of economic crisis, a manager who owns a company is more motivated to invest

extra effort, compared to a CEO or a chairman. In short: the more you own, the more you stand to lose in a crisis.

The partial output elasticity of *extra* with respect to effort *e* is captured by β with $0 < \beta < 1$ (we could even assume that the size of β changes from a normal situation to a crisis). Assuming that the three groups of actors equate the time share of their marginal productivity to their marginal cost of extra effort $c'(e)$ with $c'(e) > 0$ to (1), we get:

$$\alpha_i \beta e^{\beta-1} = c'(e) \quad (2)$$

All actors have the same β and therefore only the contract parameter α_i matters for the supply of extra effort (by definition the effort for $\alpha_o = 1$ would be optimal). This basic idea should, of course, be adapted when particular competitive environments and monitoring technologies, etc., prevail. But these additional assumptions are not necessary in our case. While monitoring and increased regulation, can lead to a higher performance in simple jobs (Frey, 1992; Lazear, 2000), the case is different for management jobs, where intrinsic motivation is essential. Here monitoring is less or not effective and could lead to a crowding out effect (Frey, 1992).

4.2.2 Firm performance as a proxy of manager's effort

Prior research has tested the assumptions above by relying on firm performance as a proxy for manager's effort. The more extensive the ownership, the more effort an agent is willing to put into her/his firm. For example, Morck et al. (1988) find evidence that the market valuation of a firm increases with the level of management ownership. Similarly, Core et al. (1999) find that firms with low levels of management-ownership perform worse. He (2008) and Anderson and Reeb (2003) show evidence that founders, who typically own the company, are better CEOs than non-founders. Kroll et al. (1997) demonstrate that for manager-controlled firms, acquisition announcements result in negative excess returns to shareholders, while for owner-manager-controlled firms, such announcements result in positive excess returns.

Typically, firm performance is used to capture the effort a manager exerts in her/his firm. However, firm performance may not be the best measure to test effort, especially not in a multi-agent situation under uncertainty. Several problems accompany the use of firm performance: First, the applied performance measures are generally very noisy signals and do not necessarily directly measure the performance of management nor of a particular manager (Morck et al., 1988). Managers typically have only a small impact on corporate performance (Daily & Dalton, 1992). A meta-analysis consequently supports that there is little evidence of

a systematic ownership-performance link (Dalton et al., 2003), results that were also shown by Kania and McKean (1976).

Second, professional CEOs may be incentivized to behave myopically due to their performance-evaluation system. They are often more interested in maximizing short-term returns rather than maximizing the long-term profitability, because in doing so, they maximize their own income. In contrast, an owner identifies himself much more with her/his company and is more interested in long-term success (Anderson & Reeb, 2003; James, 1999). Explicit contracts focusing on specific actions could cause agents only to invest effort on these specific actions (Prendergast, 1999). Due to the dependence of CEOs' payments largely on the stock performance of a firm, CEOs will concentrate on actions with beneficial effects on stock performance. As a result, the often-used performance measurements test short-term effort instead of long-term firm success, and thus may overestimate the effort of some CEOs and underestimate the effort of others.

Third, performance measures are prone to manipulation. On the one hand, agents can be motivated to game measurements in order to generate results that will be better than the true value. On the other hand, the principal may want to keep success low (Prendergast, 1999). Taken all together, these findings indicate that firm performance may be not the best measure to test the true value of effort an agent contributes.[6]

4.2.3 Golf handicaps as a proxy of manager's extra effort

In order to find other measures of the manager's (extra) effort, we change the perspective. Instead of firm performance, we look at individual effort directly by using the leisure activities of a top manager as a mirror image for effort. The idea is that the more time a manager spends on her/his leisure, the less time s/he can invest in work activities. The sport of golf seems to be suitable here: Golf is very popular among managers, with many managers spending a considerable portion of their scarce spare time on the golf course (Ceron-Anaya, 2010).

The popularity of golf among managers can be explained by its historical and sociological roots:

[6] Results could change when other measurements than firm performance are used. Frick's (2004) study that uses product quality as an indicator for manager's performance finds conflicting results regarding the agency theory. The results show that firms ruled by an owner-manager produce wine of lower quality than firms with an employed manager on the top. While this result is not in line with our theory, it could be explained by the missing human capital of owner-managers and the specific characteristics of the wine industry.

"*The sport required a mind-set such as daring attitudes and strategic thought, aspects that were also present in the daily life of any businessmen. The time necessary to play a round of golf meant extended opportunities to network and form rapport among business partners. Golf symbolically represented the fight against nature that businessmen constantly confronted in their work. This game, as any other sports, created a relaxed environment, which induced more friendly interactions. The combination of individualism and peer-trust engendered by golf were fundamental components in economic environments. The game therefore became a metaphor for what the business world was about.*" (Ceron-Anaya, 2010, p. 355)

For example, in 2005, Newsweek explained, "*more and more Business Schools offer classes on golf [...] a common element of corporate life, so students learn how to handle themselves on the green*" (Di Meglio, 2005). While the networking aspect of golf underlines the usefulness of the sport for business activities, the case is different for improving golf handicaps. Malmendier and Tate (2009) point out that one could view golf handicaps as a measure to divert effort from the firm into leisure activities. The authors show with several measures, that *superstar CEOs* underperform after receiving an award compared to a matched sample of CEOs that have not received an award. One measure they use is the golf handicap and they show that award-winning CEOs have significantly better golf handicaps than non-winners, consistent with more time spent on leisure activities, and consistent with the observation that golf is more common in firms with poor corporate governance. Their focus is not on studying the manager's effort by golf handicaps. Instead they compare firm performance of award-winning CEOs with non-award-winning CEOs. The golf handicap here is only one of several measures for activities that distract the manager's attention from business activities. Generally, to improve your handicap you should invest more time solely concentrating on your game both on the driving range and on the golf course. Playing with business partners only in order to network or negotiate business deals will not improve the handicap. Therefore, a golf handicap – that represents the playing potential of a golfer – can be seen as a mirror-image measure of effort and has the great advantage of being directly observed.

Using golf handicaps, our aim is to look into the relationship between different degrees of ownership and their implications for the extra effort that agents exert, especially when they change management positions and in times of economic crisis. Please note we do not make inferences about how the different economic actors have acquired their respective golf

handicaps.[7] We concentrate on the change in golf handicaps after a management-position change or during an economic crisis and we are not interested in the initial score of the handicap.

We argue that handicap improvements are very time consuming. In that respect, we expect that, especially when persons change their management positions, they exercise different levels of effort within the new position. We measure this effect by looking at the changes in handicaps. We compare developments before and after the position change in order to see whether actors change their behavior and invest more or less time in business operations.

Because of the different stakes in the company output described above, we expect that handicaps change for management actors in different magnitude and different directions. We should generally find that the handicaps of owners react more to management-position changes than the handicaps of CEOs. Further, the handicaps of CEOs should react more to management-position changes than the handicaps of chairmen. The different stakes in the company output are associated with spending a different amount of time in the golf handicap training, which should result in different handicap development. It implies that – compared to all other possible positional changes – persons who become owners invest the most time in business operations, i.e., their handicaps worsen the most. Vice-versa, persons who exit the (labor) market, which means they give up their CEO or chairman position, should have a lot of time for exercising golf and their handicaps are likely to improve most. Between these extreme groups we should find differences in the efforts of chairmen becoming CEOs, of CEOs becoming chairmen and of owners becoming employed managers, i.e., becoming CEO or chairman. We expect the following results for these management-position changes: chairmen becoming CEOs should exert more effort compared to CEOs becoming chairmen, i.e., the handicap of the first group (chairmen becoming CEO) worsens, because they invest more time in business affairs as CEOs. The handicap of the second group (CEO becoming chairmen) are likely to improve, because these new chairmen are likely to spent more time on the golf course compared to their time as CEO. Further, owners becoming employed managers (CEOs or chairmen) lower their efforts in business operations more than CEOs becoming chairmen. Underlying this is the assumption that effort changes are highest if persons change from an owner position to an employed position, and vice-versa.

[7] Different handicap levels could be explained by having different access to golf lessons. For example an owner being heir, may have gained more golf experience at a younger age compared to an aspiring manager with a modest background.

Hypothesis 1a: *Golf handicaps worsen most when managers become firm owners, followed by chairmen becoming CEOs.*

Hypothesis 1b: *Golf handicaps improve most when managers leave the (labor) market, followed by owners becoming employed managers and followed by CEOs becoming chairmen.*

Furthermore, we expect that, especially in a crisis, namely in the global economic crisis that started in 2007/2008, no actor wants to be seen investing time or having the time for improving her/his golf handicap. We compare developments before and during the crisis in order to see whether actors changed their behavior and invested more time in business operations.

The argument that golfers spent less time playing golf during the crisis is also supported by the operation figures of golf clubs. A majority of golf courses reported a decrease in rounds and revenues in 2009 (KPMG, 2010). In addition, we can find evidence that a crisis influences the effort of individuals: Lazear et al. (2013) show that individuals work harder during a recession.

Taken all together, we expect that in a crisis, handicaps worsen[8] for all management actors, but in different magnitude. Because of equation (2) we should find handicaps of owners to worsen more than the handicaps of CEOs. Furthermore, the handicap of CEOs should deteriorate more, compared to the handicaps of chairmen.

Hypothesis 2: *In times of crisis, golf handicaps worsen most for owners, followed by CEOs and then chairmen.*

4.3 Data

The dataset used for the analysis consists of 440 Swiss top managers and their handicaps during eight years, i.e., from 2003 until 2010.[9] The handicaps and the position of top manager are taken initially from annually published data in the Swiss economic magazine *Bilanz*. We combined these data with our own research, checked the position and the company of every manager by hand, made adjustments where necessary, and built four actor categories: Owner,

[8] Worsening means that the handicap figures increase. Therefore, a golfer whose handicap changed from 20 to 21 within a year has lost playing potential.

[9] The rankings are published at the beginning of each year, i.e., the ranking of 2010 measures handicaps of the year 2009. We considered this time lag by allocating each ranking to the preceding year. The number of managers from which a handicap is obtained is as follows: 2003 = 197, 2004 = 278, 2005 = 291, 2006 = 257, 2007 = 284, 2008 = 303, 2009 = 300 and 2010 = 312.

CEO, chairman and golfer who do not belong to any of the three groups (mainly these are former CEOs or former chairmen). The last group serves as the reference group in our regression models.

The companies in our sample are from different industries with an overrepresentation of the financial industry (about one third of the sample). In the dataset we obtain 132 management-position changes that are relevant in order to test Hypotheses 1a and 1b. As shown in Table 4.1, we coded positional changes by ascertaining from which to which position a person switched. In our sample 14 persons become owners, 15 chairmen become CEOs, 39 CEOs become chairmen, 12 owners become employed managers (CEOs or chairmen) and 52 managers exit the (labor) market. Overall we obtain: (1) 64 person-years (i.e., we used 64 handicap observations) before the position change and 48 person-years after the position change for persons becoming owners; (2) 73 person-years before the position change and 47 person-years after the position change for chairmen becoming CEOs; (3) 179 person-years before the position change and 125 person-years after the position change for CEOs becoming chairmen; (4) 54 person-years before the position change and 42 person-years after the position change for owners becoming employed managers; and (5) 304 person-years before the position change and 112 person-years after the position change for managers with (labor) market exits.

Table 4.1: Management-position changes in the dataset

Management-Position Changes	**Number of Persons**	Number of CEOs	Number of Chairmen	Number of Owners	Number of former CEOs/ Chairmen	**Number of Person-Years before Position Change**	**Number of Person-Years after Position Change**
Become an Owner	14	3	7	0	4	64	48
Chairman becomes CEO	15	0	15	0	0	73	47
CEO becomes Chairman	39	39	0	0	0	179	125
Owner becomes CEO/Chairman	12	0	0	12	0	54	42
(Labor)Market Exit	52	35	17	0	0	304	112

Table 4.1 documents the 132 management-position between 2003 and 2010.

In our analysis we further differentiate between two time periods: The first period from 2003 to 2007 describes economic times in boom markets, while the second period from 2008 to 2010 captures the years of the global financial crisis.

We apply random-effects models to test our hypotheses, i.e., we consider that our dataset consists of a hierarchy of different individuals whose differences relate to that hierarchy. In order to control for unobserved heterogeneity, we additionally include the age group of a person, the company profit, the weather, year dummies and industry sector dummies. Building age groups by using publicly available data, such as CVs or self-portrayals of the managers, we divide persons into these age groups ranging from 1 (persons aged 21-30 years) up to 7 (persons aged 81-90 years). As excellence in golf only slightly depends on physical fitness, we expect older persons are better golfers because they had more time to practice the sport. This relationship is probably only a tendency and golfers belonging to the last category may be not as good as golfers 10 or 20 years younger. Further, we include company profit measured by the logarithms of EBIT in Swiss Francs. When company profit decreases, top managers are under pressure. They should have less time for golfing and we expect handicaps to worsen when profits are dropping. In order to differentiate between small and big companies, we use the number of employees working for a company. Every firm with more than 100 employees is defined as a bigger firm. In our dataset, around 41 percent of firms fall into this category. Company-related data are gathered by using financial or other official company reports. Weather has been measured by the number of sun hours in Switzerland within each year. It seems plausible that people play more golf if the weather is excellent and therefore it is more likely for handicaps to improve faster. Data about the weather are taken from Switzerland's national weather and climate service *MeteoSwiss*. Finally, we include year and industry sector dummies. Year dummies are important in order to control for general handicap improvement within the sample, for example, due to learning over time. Additionally, the year dummies enable us to include a crisis-interaction variable. Sector dummies may be important if the significance of golf for business differs between industry sectors.

Table 4.2: Descriptive statistics

	Variable	Mean	Std.Dev.	Min	Max	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Handicap	18.64	7.82	-.20	36.00															
2	Owner	.16	.36	.00	1.00	-.20														
3	CEO	.36	.48	.00	1.00	.01	-.33													
4	Chairman	.39	.49	.00	1.00	.10	-.35	-.59												
5	Become an Owner	.01	.11	.00	1.00	.00	.34	-.11	-.12											
6	Chairman becomes CEO	.01	.11	.00	1.00	-.08	-.07	.20	-.12	-.02										
7	CEO becomes Chairman	.03	.18	.00	1.00	.05	-.11	-.18	.30	-.04	-.04									
8	Owner becomes CEO/Chairman	.01	.11	.00	1.00	-.10	-.06	-.01	.08	-.02	-.02	-.03								
9	(Labor)Market Exit	.03	.17	.00	1.00	.05	-.10	-.14	-.18	-.03	-.03	-.05	-.03							
10	Owner × Crisis	.06	.24	.00	1.00	-.13	.59	-.19	-.21	.30	-.04	-.06	-.03	-.06						
11	CEO × Crisis	.13	.34	.00	1.00	-.03	-.18	.54	-.32	-.06	.21	-.10	.03	-.08	-.10					
12	Chairman × Crisis	.15	.36	.00	1.00	.04	-.19	-.33	.55	-.07	-.06	.27	.09	-.10	-.11	-.18				
13	Age group	4.66	.75	1.00	7.00	-.01	.02	-.12	.04	.04	.06	.02	.02	.07	.04	-.01	.09			
14	Company Profit (log)	18.60	1.37	9.15	24.28	.00	.00	.05	-.10	-.02	.03	-.02	.00	.02	-.01	.03	-.05	.00		
15	Firm size	.41	.49	.00	1.00	.12	-.27	.07	.08	-.04	-.01	-.01	-.12	.10	-.15	.00	.02	-.01	.00	
16	Weather	1876.45	127.62	1685.16	2135.99	.02	.00	.02	.00	-.02	-.04	-.05	-.03	-.09	-.17	-.26	-.28	-.20	-.01	.04

Table 4.2 documents the descriptive statistics and bivariate correlations for the variables used in Tables 3 and 4. For reasons of clarity, the table does not include sector- and year-dummies. The number of observations is N=2222.

4.4 Results

Table 4.2 reports the descriptive statistics and correlations of the used variables.[10] Table 4.3 documents the random-effects regression results by using golf handicap as dependent variable. Model a is the basic model. The model entails the control variables and the (year-specific) general effects of a management position within our dataset. All management actors of interest are added as a binary variable in the regression; the group of retired managers (especially former CEOs and former chairmen) serves as control group and is not included in the model. Model a is, however, not a test for our hypotheses. It only makes inferences about how the different management-position holders differ in their golf handicaps. In Model b we therefore extend Model a by including the effects of a management-position change on the development of golf handicaps. We test how each position holder's initial handicap scores change when the manager switches her/his position. The variables compare the handicap of one person before the position change with the handicap after the position change. For example, the variable *Become an Owner* tests the score of the handicap of one person being CEO or chairmen, with the situation of being an owner in later years. In Models c-f we extend Model a by considering the changes in golf handicaps during the economic crisis, i.e., we test how each position holder's initial handicap scores change during the financial crisis. In the following we discuss the findings of each model. As indicated in Model a, the handicaps of owners, CEOs and chairmen do not significantly differ from the handicaps of retired managers. The Wald test further shows that the handicaps of owners do not significantly differ from the handicaps of CEOs and chairmen and that the handicaps of CEOs and chairmen do not significantly differ from each other. The findings thus show that no management actor group has acquired better golf handicaps as another group, for example due to more golf experiences at a younger age.

Model b additionally considers positional changes between management groups. Compared to management actors with no positional change during the observed time period, handicaps significantly deteriorate by 2.13 ($p < .001$) for persons who become owners; chairmen becoming CEOs face no significant handicap mutations; CEOs becoming chairmen slightly improve their handicaps by -.68 ($p < .10$); owners becoming CEOs or chairmen noticeable improve their handicaps by -1.24 ($p < .05$); and person who exit the (labor) market strongly improve their handicaps by -2.17 ($p < .001$).

[10] Please note that we have one really excellent golfer in our sample whose handicap is even better than 0. Hence his handicap has a negative sign indicating that it is above 0.

With respect to Hypotheses 1a and 1b we further test the differences between the former management groups. The findings reveal that the parameter for *Become an Owner* is significantly different from *Chairman becomes CEO* (chi2 = 6.45, p < .05), *CEO becomes Chairman* (chi2 = 12.85, p < .01), *Owner becomes CEO/Chairman* (chi2 = 9.00, p < .01) and *(Labor)Market Exit* (chi2 = 24.90, p < .001). Further, the parameter for *Chairman becomes CEO* is not significantly different from *CEO becomes Chairman* (chi2 = 1.83), but significantly different from *Owner becomes CEO/Chairman* (chi2 = 3.51, p < .1) and *(Labor)Market Exit* (chi2 = 12.07, p < .001). The parameter for *CEO becomes Chairman* is not significantly different from *Owner becomes CEO/Chairman* (chi2 = .72), but is significantly different from *(Labor)Market Exit* (chi2 = 6.56, p < .05). Finally, the parameter for *Owner becomes CEO/Chairman* is not significantly different from *(Labor)Market Exit* (chi2 = 1.35).

Table 4.3: Random effect regression results

Random effect model Dependent variable: handicap	**Model a** B (SE)	**Model b** B (SE)	**Model c** B (SE)	**Model d** B (SE)	**Model e** B (SE)	**Model f** B (SE)
Management Position (Reference Retirees)						
Owner	-.35	-3.72 ***	-.65 †	-.36	-.33	-.53
	(.34)	(.77)	(.35)	(.34)	(.34)	(.38)
CEO	-.18	-2.20 ***	-.25	-.11	-.14	-.08
	(.22)	(.49)	(.22)	(.23)	(.22)	(.29)
Chairman	-.28	-1.82 ***	-.32	-.28	-.15	-.16
	(.23)	(.49)	(.23)	(.23)	(.24)	(.28)
Management-Position Changes (Reference No Position Change)						
Become an Owner		2.13 ***				
		(.68)				
Chairman becomes CEO		.08				
		(.41)				
CEO becomes Chairman		-.68 †				
		(.35)				
Owner becomes CEO/Chairman		-1.24 *				
		(.61)				
(Labor)Market Exit		-2.17 ***				
		(.50)				
Management Positions within the Crisis (Reference No Crisis)						
Owner × Crisis			.66 ***			.41
			(.21)			(.34)
CEO × Crisis				-.21		-.28
				(.18)		(.31)
Chairman × Crisis					-.26	-.27
					(.16)	(.30)
Age group	.16	.18	.19	.17	.17	.19
	(.17)	(.17)	(.17)	(.17)	(.17)	(.17)
Company Profit (log)	-.03	-.03	-.03	-.03	-.04	-.04
	(.05)	(.05)	(.05)	(.05)	(.05)	(.05)

Random effect model Dependent variable: handicap (continuation)	**Model a** B (SE)	**Model b** B (SE)	**Model c** B (SE)	**Model d** B (SE)	**Model e** B (SE)	**Model f** B (SE)
Firm size	.02	-.08	-.02	.01	.02	-.02
	(.25)	(.25)	(.25)	(.25)	(.25)	(.25)
(Reference sector 6)						
sector_1	-2.67	-2.57	-2.67	-2.67	-2.66	-2.66
	(2.44)	(2.43)	(2.45)	(2.44)	(2.45)	(2.44)
sector_2	-1.99	-2.13	-2.01	-2.01	-1.98	-2.03
	(1.68)	(1.66)	(1.68)	(1.68)	(1.68)	(1.68)
sector_3	-4.51 †	-4.09	-4.50 †	-4.49 †	-4.53 †	-4.50 †
	(2.56)	(2.55)	(2.57)	(2.56)	(2.57)	(2.56)
sector_4	-1.34	-1.13	-1.34	-1.34	-1.34	-1.34
	(1.08)	(1.07)	(1.08)	(1.08)	(1.08)	(1.08)
sector_5	-2.00	-2.18	-2.04	-2.02	-1.99	-2.03
	(1.95)	(1.93)	(1.95)	(1.95)	(1.95)	(1.95)
sector_7	-2.15 †	-2.01 †	-2.19 †	-2.15 †	-2.15 †	-2.18 †
	(1.17)	(1.17)	(1.17)	(1.17)	(1.17)	(1.17)
sector_8	.35	-.08	.36	.35	.34	.35
	(1.95)	(1.94)	(1.95)	(1.95)	(1.95)	(1.95)
sector_9	2.78	2.84	2.78	2.77	2.78	2.77
	(2.57)	(2.54)	(2.57)	(2.56)	(2.57)	(2.57)
(Reference year 2004 and 2005)						
year 2006	-.31 *	-.27 †	-.31 *	-.31 *	-.31 *	-.31 *
	(.14)	(.14)	(.14)	(.14)	(.14)	(.14)
year 2007	-.59 ***	-.56 ***	-.60 ***	-.59 ***	-.59 ***	-.60 ***
	(.14)	(.14)	(.14)	(.14)	(.14)	(.14)
year 2008	-.79 ***	-.74 ***	-.80 ***	-.79 ***	-.79 ***	-.80 ***
	(.15)	(.15)	(.15)	(.15)	(.15)	(.15)
year 2009	-1.14 ***	-1.12 ***	-1.27 ***	-1.07 ***	-1.04 ***	-1.02 ***
	(.14)	(.15)	(.15)	(.16)	(.16)	(.31)
year 2010	-1.41 ***	-1.38 ***	-1.54 ***	-1.35 ***	-1.30 ***	-1.29 ***
	(.15)	(.15)	(.15)	(.16)	(.16)	(.30)
year 2011	-1.65 ***	-1.61 ***	-1.77 ***	-1.58 ***	-1.53 ***	-1.52 ***
	(.17)	(.17)	(.17)	(.18)	(.18)	(.31)
Weather	.00	.00	.00	.00	.00	.00
	(.00)	(.00)	(.00)	(.00)	(.00)	(.00)
Constant	2.72 ***	22.71 ***	2.69 ***	2.69 ***	2.66 ***	2.59 ***
	(1.84)	(1.88)	(1.84)	(1.85)	(1.84)	(1.84)
R-sqr-overall	.0310	.0543	.0307	.0314	.0309	.0311
Wald-chi	196.56 ***	227.96 ***	207.45 ***	198.01 ***	199.32 ***	208.11 ***
N	2222	2222	2222	2222	2222	2222
N-Groups	440	440	440	440	440	440
Observations per group: max	8.00	8.00	8.00	8.00	8.00	8.00
avg	5.00	5.00	5.00	5.00	5.00	5.00
min	1.00	1.00	1.00	1.00	1.00	1.00

Table 4.3 documents the random-effects regression results by using golf handicap as dependent variable. Model a is the basic model. The model entails the control variables and the (year-specific) management position of each person within our dataset. All management actors of interest are added as a binary variable in the regression; the group of retired managers (especially former CEOs and former chairmen) serves as control group and is not included in the model. Model a makes inferences about how the different management positions affect the golf handicaps. In Model b we therefore extend Model a by additionally including the effects on the development of golf handicaps of a management-position change within the observed time period. We test how each position holder's initial handicap scores change during a management-position change. In Models c-f we extend Model a by considering the changes in golf handicaps during the economic crisis, i.e., we test how each position holder's initial handicap scores change during the financial crisis.
In the table significant levels are highlighted as follows: † p<.10, * p<.05, ** p<.01, *** p<.001.
We performed Wald tests about the parameters of the fitted model.

Model b in Table 4.4 documents the results of a robustness check for the former findings. Instead of using a random-effects regression model we repeated the regression by using an OLS regression with robust standard errors. As indicated by the findings, the results for the most interesting coefficients are robust.

Overall the results support Hypotheses 1a and 1b not completely, but in great part. Hypothesis 1a expected to find the strongest handicap deteriorations for persons switching to an owner position. While we cannot confirm that the change from a chairman to a CEO position is associated with more firm effort, the positive sign and the significant difference from chairman switching to CEO is significantly supported.

Hypothesis 1b expected highest positive changes for people leaving the labor market. The results give evidence that leaving labor market leads to a significantly better handicap and is significantly different from the other position changes (except for the comparison of *(Labor)Market Exit* with the *Owner becomes CEO/chairman*). It supports the validity of handicaps as an effort measurement. It is very likely that people leaving a management position spend more time on leisure activities and thus improves their handicap. The assumption that leaving the owner position leads to a better handicap seems to be correct as well. While *Owner becomes CEO/Chairman* has a negative sign and the value is as predicted between the *(Labor)Market Exit* and *CEO becomes Chairman* parameters, we cannot clear that it is significantly different from *(Labor)Market Exit* and *CEO becomes Chairman*.

The question remains about the size and importance of the former effects. Handicaps normally range from 0 up to 36. In our sample, the mean handicap is 18.64, demonstrating that a lot of excellent golfers are included. On average, a golfer improves her/his handicap in one year by -.29 with a standard deviation of 1.47. Thus, a downward slide of 2.13 (as indicated by the *Become an Owner* coefficient), an improvement of -.68 (as indicated by our *CEO becomes Chairman* effect) or an improvement of -1.24 (as indicated by our *Owner becomes CEO/Chairman* effect) is a huge change in any case and clearly above an average change in a year. The changes indicate that a fairly lower (respectively higher) amount of practice time was required. Furthermore, especially better golfers have to invest a significant amount of time because the better the handicap, the harder it is to improve.[11]

[11] The reason is that golfers with better handicaps already need less extra strokes. A further reduction of extra strokes by one stroke, therefore, is harder the better the golfer already is.

Models c-f extend the basic Model a by considering the changes in golf handicaps during the economic crisis, i.e., we test how each position holder's initial handicap score changes during the financial crisis. To avoid multicollinearity Models c, d and e separately consider the interaction terms between management position and financial crisis. Model f includes all interaction terms at once. In line with Hypothesis 2, the findings in Model c show that the handicaps of owners significantly deteriorated by an amount of .66 ($p < .001$) during the financial crisis. Models d and e further reveal that CEOs and chairmen improved their handicaps during the financial crisis by an amount of -.21 and -.26. These improvements are, however, not significant. Considering all former effects jointly, Model f replicates the former results. During the financial crisis the handicaps of owners deteriorated by an amount of .41, and the handicaps of CEOs and chairmen improved by an amount of -.28 and -.27. Even though in Model f none of these effects is significant, the Wald-test confirms that the parameters for *Owner* × *Crisis* and *CEO* × *Crisis* (chi2 = 8.17, $p < .01$) and for *Owner* × *Crisis* and *Chairman* × *Crisis* (chi2 = 9.20, $p < .01$) are significantly different from each other. There is, however, no significant difference for the parameters for *CEO* × *Crisis* and *Chairman* × *Crisis* (chi2 = .00). It suggests that during the financial crisis owners spend significantly less time on the golf course as compared to employed managers, i.e., CEOs or chairmen. Recalling that on average, a golfer in our sample improves her/his handicap in one year by -.29, the handicap deterioration of owners by .41 points shows that for owners, the crisis seems to have strong effects. This indicates that the time for extended practice sessions was missing for owners and the golfers were not able to keep their level of playing potential. Compared to the -.27/ -.28 improvement of CEOs and chairmen during the crisis, the owner position is much more demanding and owners invest more time in crisis compared to managers in other management positions. Particularly with respect to the size of the handicap development, the results support Hypothesis 2, suggesting that in times of crisis, golf handicaps worsen most for owners.

Model f in Table 4.4 documents the results of a robustness check for the former findings. Instead of using a random-effects regression model we repeated the regression by using an OLS regression with robust standard errors. As indicated by the findings, the financial crisis results are not very robust. Even though the relative size of the obtained effects point in the same direction, the Wald-test confirms no significant differences for the parameters *Owner* × *Crisis*, *CEO* × *Crisis* and *Chairman* × *Crisis*. This suggests that the support for Hypothesis 2 must be seen with caution.

Finally, with respect to our control variables, the results in Table 4.3 indicate that the handicaps of golfers in our dataset improve over time. There are also some weak differences between sectors, supporting the ordinary assumption that the importance of golf for business varies between industries.

Table 4.4: Robustness test: OLS regression results

OLS regression model with robust standard errors Dependent variable: handicap	**Model b** B (SE)	**Model f** B (SE)
Management Position		
(Reference Retirees)		
Owner	-5.01 **	-4.20 **
	(1.80)	(1.58)
CEO	-.92	-.90
	(1.58)	(1.38)
Chairman	-.13	-.11
	(1.61)	(1.36)
Management-Position Changes		
(Reference No Position Change)		
Become an Owner	4.36 **	
	(1.69)	
Chairman becomes CEO	-4.49 †	
	(2.38)	
CEO becomes Chairman	.14	
	(1.41)	
Owner becomes CEO/Chairman	-6.20 ***	
	(1.27)	
(Labor)Market Exit	.57	
	(1.75)	
Management Positions within the Crisis		
(Reference No Crisis)		
Owner × Crisis		-.63
		(1.24)
CEO × Crisis		-1.41
		(1.35)
Chairman × Crisis		-.87
		(1.26)
Constant	21.07 **	21.61 **
	(6.96)	(6.77)
Control variables included	Yes	Yes
R-sqr-overall	.0940	.0726
F-value	3.65 ***	2.69 ***
N	2222	2222

Table 4.4 documents the OLS regression results with robust standard errors by using golf handicap as dependent variable. The results serve as a robustness check for the findings in Table 4.3. Models b and f entail the control variables and the (year-specific) management position of each person within our dataset. All management actors of interest are added as a binary variable in the regression; the group of retired managers (especially former CEOs and chairmen) serves as control group and is not included in the model. In Model b we additionally include the effects on the development of golf handicaps of a management-position change within the observed time period. We test how each position holder's initial handicap scores change during a management-position change. In Model f we consider the changes in golf handicaps during the economic crisis, i.e., we test how each position holder's initial handicap scores change during the financial crisis.
In the table significant levels are highlighted as follows: † p<.10, * p<.05, ** p<.01, *** p<.001
We performed Wald tests about the parameters of the fitted model.

4.5 Conclusion

In this study, we tried to find a new approach to measure the effort of top managers. Our findings support Jensen and Meckling's (1976) theory that the higher the degree of ownership, the more agents allocate their time to business instead of to leisure activities. In contrast to prior empirical tests that use firm performance as an indirect measurement of agents' effort, we use golf handicaps as a direct measurement of agents' effort. The more time individuals invest in their firm, the less time they can spend improving their golf handicap. The findings show that management-position changes worsen golf handicaps most for individuals who become owners, followed by chairmen becoming CEOs. Vice-versa, CEOs becoming chairmen, owners becoming employed managers (CEOs or chairmen), and managers who leave the labor market can improve their handicap significantly, which indicates that these changes are associated with having more leisure time.

Furthermore, in times of crisis, owners – who have the largest stake in the company output – show the highest extra effort, compared to CEOs and chairmen. Effort differences between management actors are especially visible during positional changes and an economic crisis. This effect can be explained by the loss aversion of individuals (Kahneman & Tversky, 1984). Owners hold the highest share of a company, implying that more of their own property is at risk. As a result, they respond most strongly during the uncertainty caused by positional changes or bad economic conditions, and invest more time in the company instead of improving their golf handicap.

Like most research, our empirical sample used in this study has several limitations. First, it is restricted to one institutional environment, namely to top managers in Switzerland. Second, it is not a random sample, as only managers with a known golf handicap were included. Third, the sample could be larger. This would increase the underlying changes of positions and thus the robustness of the results. Fourth, the time period could be longer. For example, one could include additional times of crisis, e.g., the collapse of the dot-com-bubble during 1999-2001. Last, the paper mainly concentrates on management by males because there are few females who are both managers and golfers (we have only 23 females in the dataset). These limitations indicate directions for further research. Our approach suggests that the method could be transferred to other groups of agents or to alternative direct-effort measurements. Expanding the timeframe or analyzing different countries could give a deeper insight into the validity of using golf handicaps as a measure for manager's effort.

4.6 References

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